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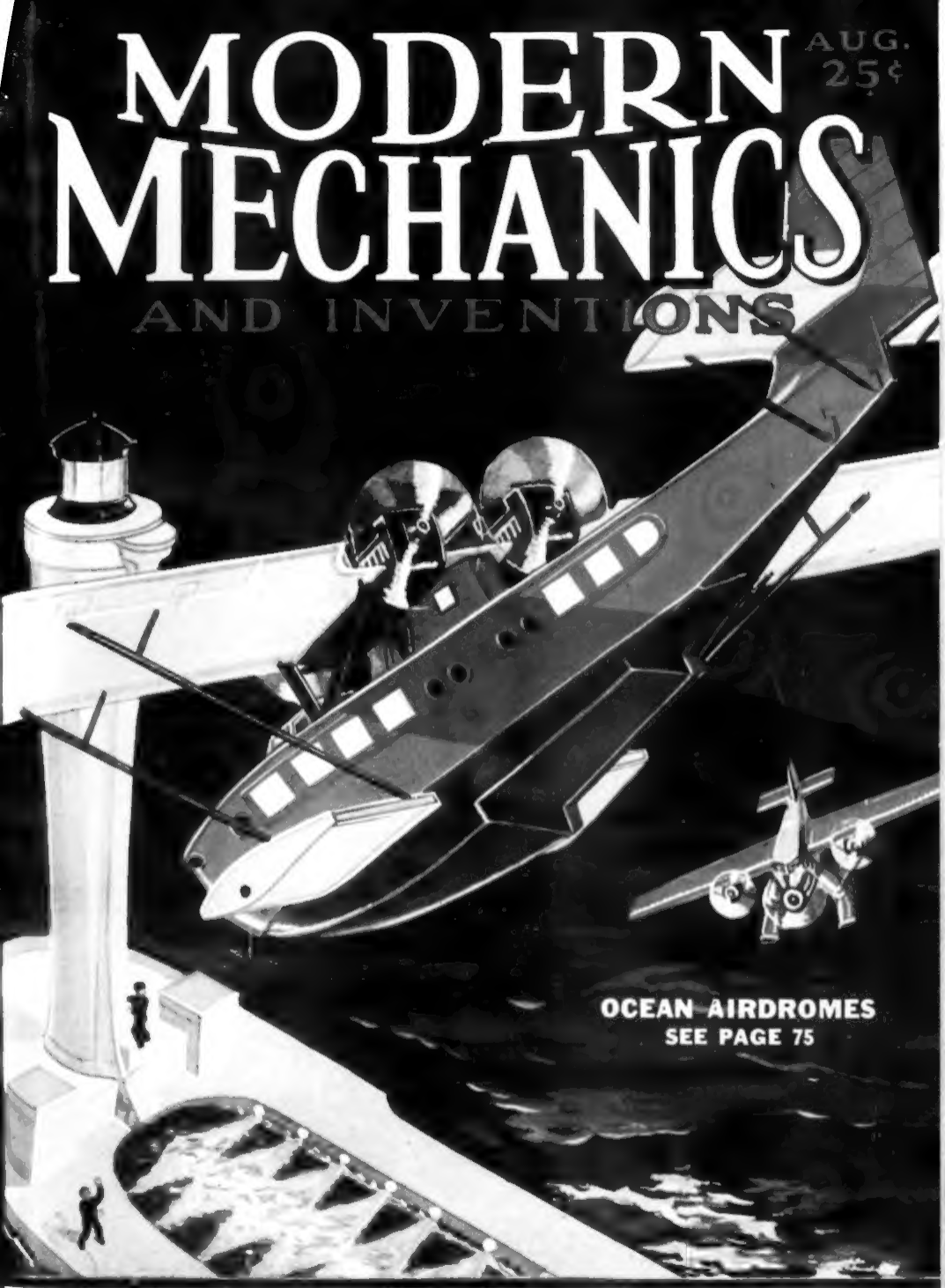

OCEAN AIRDROMES
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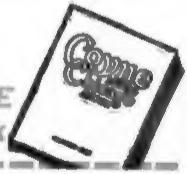

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VOL. II NO. 4 PRICE 25 CENTS

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AUGUST, 1929

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Listed below are the members of the Modern Mechanics Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers concerning their departments. Address them in care of this magazine, Robbinsdale, Minn.

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Simple, thorough practical shop methods. You learn the "why" of everything you do, then learn to do it right. You do real work with real tools and real equipment. No book studying. Very little schooling necessary. Any man from 18 to 60 can learn. Write today for Big Special Limited Time Tuition Offer.

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AVIATION is paying tremendous incomes to trained men! Coupon brings complete details about complete course in Aviation. Learn on real airplane engines under experienced instructors. **Ask about special course in FLYING.** Don't miss this remarkable opportunity. Save by enrolling at once. The sooner you start the sooner you will be ready to earn big pay or get into business for yourself.

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Without cost or obligation, send me your big FREE book on Autos and Aviation, also, full details of your special tuition offer.

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Street .....

Town..... State.....

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AUTO, TRACTOR AND AVIATION

Dept. A14-M Cincinnati, O., or Cleveland, O.

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LEARN IN 90 DAYS

ON ACTUAL MACHINERY—NO BOOKS

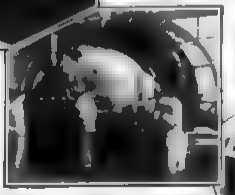
Don't let the world bluff you. Get into electricity—earn $50.00 to $150.00 a week—and hold your head as high as the next man. You can do it easily by coming to my famous electrical school. In 12 short weeks you'll pack in many years of practical knowledge. You work shoulder to shoulder with expert instructors on full-sized, moving, whirling motors, generators, batteries, switchboards, telephone and telegraph systems, etc., etc. McSweeny trained men get the biggest paying jobs. Every day I receive requests for graduates.

Big Illustrated Book Sent FREE

Today right now, take the first step out of that low pay rut. Mail the coupon to me for big, illustrated book on ELECTRICITY. Act today. Get my special Remarkable Tuition offer. **Just Mail Coupon!**

IT'S EASY THIS WAY

Experience practical work in my big school. Not a correspondence course.



No Education or Experience Needed

No books to read. No from a horse-and-buggy lectures to listen to. You learn by doing. I don't care if you can't tell a motor from a generator. If you're not fitted to fill a big-pay job I'll refund every penny of your tuition.

Satisfaction Guaranteed

I will refund every penny of your tuition if you are not satisfied. You're the sole judge of McSweeny training.

COMPLETE RADIO COURSE

McSWEENY ELECTRICAL SCHOOL

Dept. E13-H, Cleveland, Ohio

J. M. McSweeny, Pres.,
McSweeny Electrical Schools,
Dept. E13-H, Cleveland, O.

Dear Mac: Without obligation send me a copy of your big free book on ELECTRICITY also details of remarkable tuition offer and complete radio course.

Name .....

Address.....

Town..... State.....

SHOP MAILBOX

WHEN we cooked up the Win Your Wings Contest, Gang, we didn't realize that the floodgates of Uncle Sam's efficient mail delivery system would cut loose and nearly swamp us with entries.

Day after day the office has been flooded with mail from all quarters of the globe. One editor has done nothing else since the contest was announced but care for the entries, allocating them to berths according to locality, where they will await the day set for the decision of the Judges.

Of course the entries from the more thickly populated states swell to greater bulk. New York, the Eastern Seaboard States, California and Texas would seem to be leading in the number of aspirants for the free course in flying instruction, or one of the forty other prizes to be given by MODERN MECHANICS for the best identification of the six famous flyers which appeared in the June issue of MODERN MECHANICS, together with the best letter on "What I like to read Best in a Magazine of Modern Mechanics."

Nothing in the way of Contests in recent years has struck such a popular vein, and the lucky winner will be announced next issue. The story of his training will appear in MODERN MECHANICS, and you will get his first hand reactions from the time he first takes the joy stick to wobble around the sky until he sets down to a perfect three-point landing on his solo flight. It'll be a story crammed with adventure and human interest—a story of adventure such as every American boy from eight to eighty dreams of.

And in the way of contests—that isn't all, either! See this letter typical of about fifty we have had this last month:

Dear Editor:

I liked the plans for the Model Airplanes so well and the pictures of the contest planes so well that I wonder if you can't start another Model Airplane Contest for us readers. Personally I like fuselage types, scale models, new production designs. Model airplanes are easy to build and it's fun to see what the new stuff looks like. Let us have some plans—if not of new production ships, well, then, some different model stuff. And start another Model Airplane Contest.

Yours for Modern Mechanics,
ROGER CHAMPION
Lead Bottoms, Mo.

That's just what we had in mind, Mr. Champion! You model fans look at the "Sizzlefoot" design in this issue on page 137 and you'll find not only the plans for a neat little distance model, absurdly easy to build, and considerably improved over the original Fleming-Williams Sizzlefoot, but you'll also see the announcement of the next MODERN MECHANICS Model Airplane Contest. Get busy, you Fans!

In speaking about the course of the good ship MODERN MECHANICS, we must also mention the forthcoming Amateur Electrics Department. Next month will see the beginning of the most interesting and complete series of short articles on simple household and experimental electricity. This will be more complete than any series which has ever appeared in any mechanical magazine. Don't miss a single one of these plans!

(Continued on page 14)

BULLDOG FURNACE

Heats Home for 25¢ a Week!

"I can run my Bulldog furnace steady for fourteen days in normal weather conditions on the actual cost of fifty cents." So writes F. R. Redetzke, of Cleveland, North Dakota, and he adds: "Hard to believe is it? That's what some of my neighbors thought until I showed them! We have an unlimited amount of grain screenings in this country. That's the fuel I am using."

That's what the Bulldog does with about the lowest grade fuel you can think of! Here's what it does with coal:

After 6 Years—"Heats as Good as Ever"

"Our furnace has been in use 6 years and heats as good as ever."
—Arthur Cloepfil, R. F. D. No. 1, Rockport, Mo.

"Does the Work of 3 Stoves"

"This is my third winter with the Bulldog. It does the work of 3 coal stoves that I used, which only warmed up part of the house and not very well at that. My Bulldog not only does that, but 8 rooms upstairs, with great satisfaction. My house is located in a very cold place, with no protection at all. It is the easiest furnace to handle I have yet seen." E. C. Diplock, 105 Elm St., Camden, Me.

Cuts Coal Bill in Half

"I had a hot air furnace in our 7-room house before I got the Bulldog and our house was always cold. With the Bulldog it only takes *half as much coal* and we had weather below zero, and the house was nice and warm in the morning when we got up. We never have the draft on more than half an hour at a time, and it has the place red hot. It keeps the fire all day in mild weather."
—Jess T. Conrad, 1211 W. Arch St., Shamokin, Pa.

No Money Down!

Small Monthly Payments—Installed Almost as Easily as a Cook Stove!

The Bulldog is sent to you for *free inspection*. Then, if satisfied, you make only small monthly payments at our remarkably low price. Write today! *Don't* miss this chance to cut down your fuel bills! *Install a Bulldog Furnace.* It comes to you completely erected — goes through any door — fits any height of basement — and you install it yourself in less than two hours! In fact, you can install the Bulldog just about as easily as you would a kitchen stove. Don't put up with the old fashioned stove heat or some outworn furnace — when you can so easily get the greatest advance in scientific heating at an astonishingly low price. The Bulldog burns almost *any* kind of fuel, from hard coal to cheap screenings. Keeps wood fire over night. **Factory connections in both east and west. We ship from the nearest point.**

Send for Free Book

Learn how to have all the heat you want—where you want it—and save money! Remember the Bulldog is *different* — and *better!* Complete combustion of gases save 25% of your fuel bill. Exclusive Gable-Top Radistor receives *all* the direct rays of the fire. Exclusive oblong fire-pot is not only ideal for coal, but enables you to keep a wood fire over night. Remember—the Bulldog is sent for *free inspection*—then small monthly payments at an amazingly low price! Send for Free Book TODAY!

BULLDOG FURNACE CO.
19th Street and California Ave. Dept. C-235 Chicago, Ill.

Bulldog Furnace Co., 19th and California Ave. Dept. C-235 Chicago

Without obligating me, please send me your free catalog and special offer on the Bulldog Furnace.

Have you a basement? Yes ☐ No ☐

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Street Address .....

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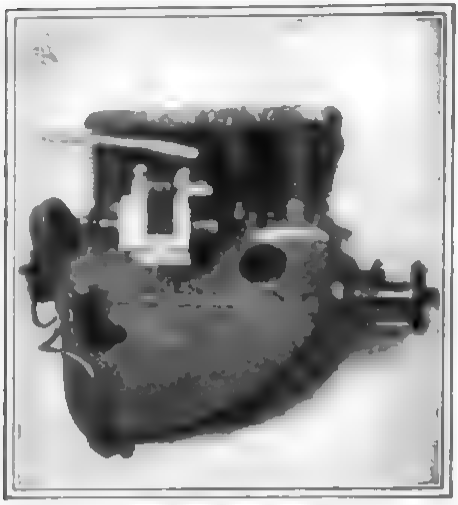
County ..... *State* .....



Here is the latest De Luxe Henderson conversion for airplane use as made by the Heath Airplane Co. Chicago, Ill.

(Continued from page 12)

Several have written substantially as has William Womack, of Port Arthur, Ontario. Says Mr. Womack:

Dear Sirs:

Everybody isn't airplane crazy. I agree almost everybody wants to see how things are built, and the feeling that I have a plan for almost anything under the sun tucked away in my files of Modern Mechanics satisfies my hoarding instincts. But my interests run more to models, especially electrical models, and I'd like to see some electrical information or dope sheets in the mag. What do you say to shooting us some stuff on simple hook ups, simple formulas for series and parallel wiring—stuff we can refer to when we get in a muddle. Also clever stuff we hadn't thought of, maybe, like animating toy ducks, and the like.

I am sure too that Model Boats ought to have a department in the mag. Please let me hear from you.

Yours till they fry jump sparks,

WILLIAM WOMACK

Port Arthur, Ontario.

Our department is the answer to those who think as Mr. Womack does.

Of course, friend Womack, you're right about everybody not being all excited about airplanes, but bear in mind that a large percentage of the readers of MODERN MECHANICS are. Until the editors of MODERN MECHANICS decide to expound the cause of the light airplane no other American publication even suspected the enormous interest in light airplanes, even supposing that they were informed as to what a light airplane really was. Now look about you and see the number of imitators MODERN MECHANICS has. Light airplane plans are being run in magazines which would not have thought of publishing them until the editors of MODERN MECHANICS led the way! And note the fact that MODERN MECHANICS has secured all of the *recognized* light plane plans—plans of the ships everybody has heard about. Oh, well gang, just another scoop. Let's be gettin' along: here's a funny note that reached Pilot Gene Shank while he was away on his endurance flight.

Dear Pilot Shank:

I recently purchased a "Flying Manual," and on page thirty I saw that you really wanted a nickel for the word "idiosyncrasies," and as I never turn a pilot down you will find it enclosed.

Yours truly,

A. KIWI (Dodo)

And the buffalo made a trip across a nearby soda fountain for a bottle of pop. Mr. Shank thanks his anonymous donor and promises to come out with some new words which he says will be worth a case of root beer.

The uses to which Fords are put is seemingly numberless. Modern Mechanics Editors were bewildered at the seemingly endless number of new uses for the old Model T Ford which were submitted in the New Uses for Old Fords Contest, now discontinued. Here is a marine conversion, by the Green Engineering Works, of Dayton, Ohio, which makes a 60 H. P. marine engine out of an old Lizzie Block!

Let This *famous* WORLD-WAR FLYER Teach You

Major Rockwell is a famous world war flyer, decorated at the front with the Legion of Honor and the War Cross. As a member of the dare-devil French Lafayette Escadrille, he spent hundreds of thrilling hours in the air. Since the war he has devoted himself to teaching men eager to get the right start in Aviation. Let him train you for this great new industry as only a veteran world war flyer can train you—and your future in aviation is assured

Major R·L·Rockwell AIR CORPS U·S·R·

*[Member of the Daring Lafayette Escadrille
Chevalier of the French Legion of Honor]*

Invites You to Join Him in AVIATION

Thousands of Big Pay, Fascinating Jobs, on the Ground and in the Air, are Begging for Trained Men •NOW•

MAN—now you can get into AVIATION easily and quickly! Now you can take your place in the most thrilling, fastest growing industry in the world! Break away from low pay and humdrum work. Aviation is begging for trained men now—mechanics, builders, flyers—at $50 to $250 a week. In this new, uncrowded field of adventure and big pay a place is waiting for you. Let me prepare you at home—in your spare hours, to be a successful air man. Let me give you in a few short months the store of practical aviation experience it took me many years to get. Let me prepare you for one of the thousands of big pay jobs. With my training, many men are now earning three and four times their former incomes. You can do the same. I'll not only train you at home—I'll also help you find the job you want after you graduate. Aviation is the game red-blooded fellows are flocking into. It is growing faster than the automobile or radio industry. Now—on the threshold of aviation's greatest development—is the time for YOU to act. Rush the coupon to me for FREE copy of my famous book. Every page will thrill you.

ACTUAL FLYING to GRADUATES *in Dayton, where Aviation was Born*

My practical home study course prepares you to fill any aviation ground job in America. You need no further training. It also prepares you to FLY. Come right along to Dayton—the cradle of aviation and the home of the Wright Brothers and Wright Field. Come here and get your actual flying at one of the world's finest and best equipped air ports. The mail service and the passenger lines are waiting for you. You can get into aviation quickly. You need no previous education or experience. Get the facts—and my remarkable tuition offer.

Major Robert L. Rockwell
THE DAYTON SCHOOL OF AVIATION
Desk J-2 DAYTON, OHIO

Rush this coupon for my big FREE BOOK. No obligation to you.

Major Rob't L. Rockwell,
The Dayton School of Aviation,
Desk J-2, Dayton, Ohio.

Dear Major: Please send me ABSOLUTELY FREE a copy of your book on AVIATION and your remarkable tuition offer. I am not obligated.

Name .....

Address .....

Town..... State..... Age...

The CONSULTING EDITOR

WELL, friends, I guess I'll be an anonymous passenger aboard the good ship MODERN MECHANICS for quite a spell, at least until the questions that can't be answered elsewhere are on the wane. This month we'll have to be curt and to the point. Here's the first question, and one which seems to be filling the minds of more than one reader:

Consulting Editor,
Dear Sir:

Since a Harley Davidson will develop about 25 h.p., why not take two of them and join them about the same shaft, changing the rotation of one, to give an air cooled motor of 50 h.p. for light airplane use?

ARNOLD JOHNSON
Grand Marais, Minn.

First, Mr. Johnson, because no rigid base could be provided for the crankshaft without running the weight way up. Secondly because the power impulses would "motor-boat" and the job would vibrate, and thirdly, because v-twins are susceptible to falling-off in power when run for more than five minutes at top speed.

The fall boatbuilding season will shortly be at hand and plans for this outboard motored cruiser, capable of better than 20 miles an hour, will be on Modern Mechanics' cargo list.

Clark Y Rib Correction

Some readers have noted what apparently was an error in the Russell-Henderson Sportplane Article. When they got to laying out the spar depth from the wing section published in the graph, which was of a Clark Y wing section, they found the depth of the spars would not tally with the figures given in the article, namely 6 inches for the front, and 4¾ inches for the rear spar construction. We respectfully call attention to the fact that Mr. Russell specifically mentions the Clark Y-15 section as the one to be used, and that the Clark Y is not the same section. It was published to show what an N.A.C.A. wing section looked like, and a cutline should have been added explaining that the Clark Y-15, to be used in conjunction with the design, is obtainable upon application to the National Advisory Committee for Aeronautics, Washington, D. C. All who have carefully constructed their planes have noted this, and the slight difference in depth, though unimportant, has been explained individually by letter.

Outboard Motors Popular

TO THOSE who follow the sport of outboarding closely, the above line will seem an admission of tardy wakening to the importance of another fascinating subject and sport. Such is miles from the case, however. Rhodes, Farmer and Hall are on the job and forthcoming issues will carry more of outboard plans such as the Elto powered Cruiser shown herewith. Boats are becoming more and more popular among people who, up to the advent of the outboard motor, have not been particularly interested, and for the old timer and the newcomer alike forthcoming num-

(Continued on page 18)

I'll Pay Your Bills

and give you a steady Income for the rest of your life

if you will take care of my business in your locality. No experience needed. Pleasant, easy work, can be handled in spare or full time.

No Investment Needed

I furnish all capital—I set you up in business, advertise you, and do everything to make you my successful and respected partner in your locality. I will make you my partner in my fast growing, established business—but I don't ask you to invest a single penny. Everything is furnished to you FREE—just look after the established business in your locality and we will split all the money 50-50! Partner may be either man or woman. All I ask is that you have ambition and can devote a few hours each day to distributing my famous products to friends and a list of established customers. High grade food products, teas, coffee, spices, extracts, things people must have to live.

Your Groceries at Wholesale

As my partner I furnish your groceries at wholesale — I do everything to see that my partners get all the advantages of Big Business. Big FREE supply contains over 32 full size packages of highest quality products. Choose all your groceries, at wholesale, from my big list of over 300 home necessities. Quality backed by $25,000.00 Bond.

Iron-Clad Guarantee to You of $15 a Day Steady Income

LOOK!

$30.47 in Hour and Half

Mrs. S. M. Jones, mother of 4, made $36 47 first 1½ hours. Working only 2 half days a week made $2000 profit in few months.

$200 in Spare Time

C. C. Miner, Iowa, made $200 *in spare time his first 15 days.* His first 4 days brought him $74 profit.

"$15 A Day Easy"

Says W. Skiles, Pa., "I have made $15 23 in only 2 hours. In addition to a big steady income he says, "You have given me $1,437 worth of gifts, checks and prizes."

Burned Mortgage On Home

Rev. McMurphy, Alabama, tells how Van brought him from poverty to a mortgage-free home, new car and financial independence.

You too can be free from money worries for life—send the coupon.

I don't want you to take any chances. I GUARANTEE your income. This is the most amazing guarantee ever made for a steady, year 'round income. I can make this guarantee because I know you can do as well as my other partners whose letters are shown on this page.

Besides going 50-50 with my partners on profits, I WILL FURNISH YOUR HOME with hundreds of wonderful premiums, including pianos, living room sets, etc., that I give as premiums. Send coupon at once for my signed guarantee of $100.00 a week for full time or $3.00 per hour for spare time work.

SEND COUPON AT ONCE for APPLICATION

I Furnish You Chrysler Coach

This is part of my FREE outfit to you. I want my partners to be prosperous and look prosperous to gain respect from everyone in your locality. That's why I will give you ABSOLUTELY FREE this brand new Chrysler Coach to use in your business. This is no contest! It is yours to keep just as soon as you show me you are in earnest. Send coupon today.

Health-O Quality Products Co.
C. W. VAN DE MARK, Pres. & Gen. Mgr.
Dept. 2033-HH, CINCINNATI, O. Health-O Bldg.
(C) 1929—By C. W. V. DM

FREE FOOD PRODUCTS COUPON

C. W. Van De Mark
HEALTH-O QUALITY PRODUCTS COMPANY,
Dept 2033-HH,
Health-O Bldg.,
Cincinnati, Ohio.

Without obligation on my part, send at once application for territory and details of partnership offer, free food products.

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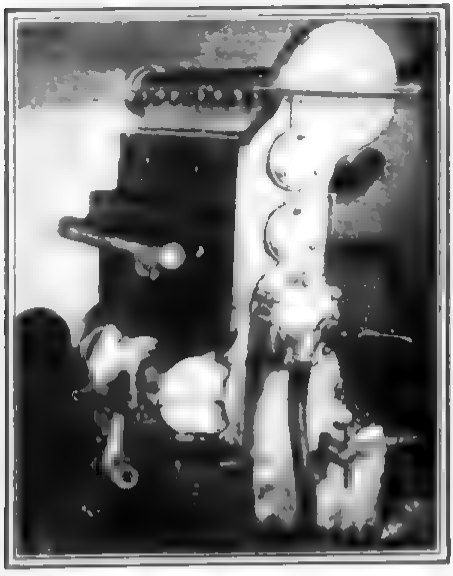
City. ..... State.....



And here is another Green Conversion, using a Ford Model T cylinder block. Parts cost $600!

(Continued from page 14)

"Souped Up" Motors

MOTORS have always been a source of interest to MODERN MECHANICS readers. Whether the motor was a souped up Lizzie engine, or a new model just designed, each succeeding paragraph concerning motors has elicited plenty of comment. We therefore are showing in this issue of the Shop Mailbox several views of new motors. Two of them are views of types of converted Ford Motors, parts for which can be supplied by the Green Engineering Works, Dayton, Ohio. Note that the only original piece of the old Model T Ford that is recognizable is the cylinder block One has overhead valves run by a special high speed cam shaft, and the other has about six hundred dollars worth of overhead cams, special crankshaft, and special fittings. It is understood they turn up around 6500 r.p.m. in marine service and develop about 60-75 h.p. Some going!

Another view is the present Heath Conversion for the four cylinder Henderson motorcycle engine. The model shown is the last year's de Luxe model. At present Mr. Heath is working on the new five bearing conversion from this year's Henderson motor, but so far says—

> **We find the new motor weighs 25 lbs. more, and we cannot turn it up within 100 r.p.m.'s of the older model with our standard propeller. The factory is showing every cooperation and we expect to have these motors ready very soon.**

With five bearings the Heath Henderson Conversion should be a 35 h.p. 120 lb. miniature counterpart of the famous British Cirrus and De Haviland Gypsy Moth engines.

Writes Mr. K. C. Carpenter, of Boise, Idaho:

> **Hello, Editors:**
> **Last month the Mechanics of Plain and Fancy Diving article was a dandy. I liked it fine. It showed me a lot about swimming I thought I knew but found I didn't, because I knew it wrong. I got a kick out of the stories of ten famous inventors, and say, tell Lewis Kelin of Detroit that the Ronald Press Co., of New York City has a good list of Model Building Books.**
>
> **Yours truly,**
> **K. C. CARPENTER.**

Thanks, friend Carpenter. We pass the word along.

Consulting Editor

(Continued from page 16)

bers of MODERN MECHANICS will contain plans for all sorts of outboard boats as well as canoes, launches, cruisers, sail boats —and, not to forget—model yachts. Whatever the type you are interested in you will find a boat to suit your needs in MODERN MECHANICS.

Here's a letter that speaks for itself:

> **Gentlemen:**
> **Please tell me where I can get books on electrical experiments. Also chemical experiments. I live in Owosso where the library is not so big and I have a hard time getting what I want to read.**
>
> **Very truly yours,**
> **JAMES SIMPSON**
>
> **Owosso, Kans.**

If you have a book in mind, MODERN MECHANICS will get it for you at the standard price providing it is in print. Address the Consulting Editor. From time to time we will publish the names of helpful books for our readers.

Mechanical Engineering
Learn at Home

MECHANICAL Engineering embraces the design, construction and operation of machines and machine tools.

It is a profession which offers almost unlimited opportunities for advancement to men who combine natural mechanical ability with special technical training.

For this is the age of machinery. Almost every convenience, luxury or necessity which we enjoy today depends on machinery for its production or adaptability to our needs. Every new invention multiplies the opportunities for competent designers, builders, erecting engineers, etc.

One of the best ways to train yourself to secure a position as a Mechanical Engineer is through the home-study courses of the International Correspondence Schools.

These courses are especially arranged to meet the needs of the student who studies at home. The theoretical work is stated in simple and clear language and engineering data is reduced to a form in which it is easily applied.

The courses are also particularly helpful because they are written by well-known mechanical engineers who have had years of practical experience in this field.

Just mark and mail the coupon and we'll gladly send you Free Booklets describing the I. C. S. courses in Mechanical Engineering or any other course in which you are interested.

Mail the Coupon Today for Free Booklet

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"The Universal University"

Without cost or obligation, please send me one of your booklets and tell me how I can qualify for the position or in the subject *before* which I have marked an X:

☐ **Mechanical Engineering** ☐ **Draftsman's Course** ☐ **Shop Practice** ☐ **Toolmaking** ☐ **Patternmaking**
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☐ Electric Lighting	☐ Advertising	☐ Concrete Builder	☐ Illustrating
☐ Practical Electrician	☐ Better Letters	☐ Plumbing	☐ Art Drawing
☐ [redacted]	☐ Spanish ☐ French	☐ Heating and Ventilating	☐ Cartooning

[redacted] ..... Street Address .....

City ..... State .....

Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

"They Snickered When I Got Up To Speak"

—But from the First Word, I Held Them Spellbound

THE banquet hall was crowded. Suddenly I heard the chairmans' voice say—"We will now have a few words from Mr. Byron Munn." It came like a flash of lightning! He was unexpectedly calling on *me* for a speech!

As I started to get up, I heard a titter run around the table.

"Watch him make a fool of himself," I overheard someone whisper. "He's so bashful he's afraid of his own voice."

I knew they were expecting me to make myself ridiculous, but I only grinned inside.

I stood squarely on my two feet and started in!

"But When I Commenced to Speak"

Almost from the first word, the smiles of doubt and derision faded from their faces. They were incredulous—amazed! Instantly the atmosphere became so tense that you could have heard a pin drop! No snickers nor sneers *now!* My voice, clear as a bell—strong, forceful, unfaltering—rang out through the banquet hall as I hammered home each point of my message with telling strokes! I let myself go—soaring to a smashing finale that almost brought them to their feet!

When I finished, there was an instant of dead silence! And then it came—a deafening wave of applause rolling up from one hundred pairs of hands—spontaneous, excited, thrilling!

Was Once a "Human Clam"

After it was all over, Jack Hartray fell into step beside me as I left the hall. "Geo, that was a great speech!" he said enthusiastically. "You certainly raised yourself about 100% in the eyes of every person in that place tonight. . . . And yet they used to call you 'a human clam'—and the quietest man in the office!"

It was true too. All my life I *had* been handicapped with a shy, timid and retiring nature. With only a limited education I never could express my ideas in a coherent forceful way. As a result I saw dozens of men with less ability pass me by simply because they were good talkers and knew how to create the right impression. It was maddening.

A Lucky Accident

At last I accidentally ran across a little book entitled *How to Work Wonders With Words*. Between its covers I discovered certain facts and secrets I had never dreamed of. Difficulties were swept away as I found a simple way to overcome timidity, stage-fright and self-consciousness and how to win advancement, popularity and success.

Today I hold the sort of position that I had always envied. My salary has been increased! I am not only in constant demand as a speaker in public but I am asked to more social affairs than I have time to attend. To sum it all up, I am meeting worth-while people, earning more than I ever dared expect and enjoying life to the fullest possible degree! And furthermore, the *sheer power of conducting speech* has been the big secret of my success!

The experience of Byron Munn is typical. Not only men who have made millions, but thousands of others have found success after learning the secrets of powerful, effective speech. Being able to say the right *thing* in the right *way* at the right time has perhaps been responsible for more brilliant success than any other one thing under the sun.

Get This Amazing Book FREE!

Right now, we offer to send you absolutely free, a copy of *How to Work Wonders With Words*. This remarkable little book will show you how to develop the priceless "hidden knack" of effective speech that has brought success, social position, power and wealth to so many. It will open your eyes to a new realization of what life holds in store. See for yourself! There is no obligation. You can obtain your copy free by just sending the coupon.

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Please send me FREE, without obligation, my copy of your inspiring booklet *How to Work Wonders With Words* and full information regarding your Course in Effective Speaking.

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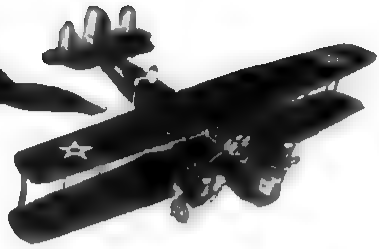
WANTED PILOTS



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Repairmen
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Engineers
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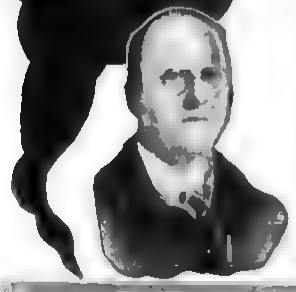

Let Greer Train You for a Big Future in AVIATION

Thousands of Pilots—Mechanics—Helpers—Salesmen—
GREER Training Puts You in AVIATION RIGHT.

ASK yourself this question: what will the aviation industry amount to in a year or so? And you know the answer—it will be America's most gigantic industry.

And question number two. Isn't it logical to assume that the men who get into aviation now will grow with the industry and be among the leaders "tomorrow?" We all know that to be so.

Even today, though aviation is still in its infancy, there is a big demand for pilots, for men in aviation factories—air transport companies — passenger and express service—air mail—barnstorming—aerial photography, motion picture work, crop dusting, etc.

Opportunity! Fellows, aviation teems with it. Reason it out for yourself; thousands of passengers and tons of mail and freight are now being swiftly and safely carried all over the country daily. Manufacturers are all behind in supplying the demand for airplanes. Why? Because there are not enough men ready to step in and function in the various branches of the industry.

In the great seven and four story Greer shops you learn on actual equipment. And what training! You learn metal construction—wing building—woodworking—engine repair—acetylene welding—carburetors—ignition—complete airplane construction — rebuilding — repairing—meteorology and navigation.

Is it any wonder that students from all over the world are to be found in the Greer Shops?

Well-known fliers—men like C. L. Laird, with many years Army and civilian flying instruction experience, and others who have made names for themselves in aviation—are the men who will supervise your training.

Why not insure yourself for a real future in this amazing industry?

When you enroll I'll pay your fare from any point in the U. S. And don't let the lack of money hold you back. We will assist you in getting employment while you are studying—and after you graduate assist you to get a still better position.

I want to mail you—free—my big aviation book. I want you to learn about the many remarkable and exclusive features of the Greer College. Learn why I say that when better pilots are trained Greer will train them.

Never mind what you may think now—rush the coupon and get all the facts. No cost or obligation so mail the coupon now.

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Please mail me free your big Aviation book and full details about your Training and Employment Service

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City .....State.....
Age .....Occupation .....

GROUND FLOOR WORK TO THE SKYS LIMIT!

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Director Extension Work
American School

3 Drafting

to prove you can

We have invented a new, simplified way to teach Drafting—the first real improvement in Drafting home instruction in history. We want you to see a few of these new Job-lessons, try them, test your own ability to master them—without one penny of cost or obligation. For instance, you will see how we get away from the "copying" methods used in the past, so you develop into a DRAFTSMAN, instead of a "tracer." See for yourself the ingenious new method which compels you to think, to solve problems, to do actual Drafting-room jobs from the very first lesson!

ANew, Rapid, Simplified Training

Copying drafting lessons prepares you to be only a "tracer." This new "Job-Method" gives you actual drafting-room jobs in a new one-step-at-a-time way. With pictures which you can understand almost without reading the "lessons." And that is why the American School-trained Draftsman can qualify for a good job at big pay when they graduate.

The American School

A two million Dollar *No-Profit* Educational Institution, now offers men a *double* service—training for a specific job, then help in finding the job. For one small price, on terms of only $6.00 a month, you are now assured of definite benefits, both in position and salary. Write for complete information—*today!*

No machine can be built until the [illegible] prepare you [illegible]

Never has [illegible] anything like [illegible] today. [illegible] demand for real Draftsmen.

5 BIG-PAY Branches

The big money in Drafting goes to men who specialize in Machine Design, or Electrical Drafting, or Architectural Drafting, or Structural, or Automotive. It is not enough merely to know *general* Drafting practice. You must know how to calculate and design and plan original work. You need many Engineering subjects to fill the kind of a Drafting position that pays $40 to $100.00 a week. The American School *now includes this specialized training in its Drafting course.*

Win Success Thru Drafting

Drafting is easy, fascinating work. Short hours. Big pay. And the Draftsman is always in line for promotion to executive positions. This training is *complete.* It includes high school subjects (if you need them) and all the Engineering and Mathematics Drafting experts require.

FREE Job Service!

The American School now offers its students and graduates, without cost, the services of an efficient employment department keeping in constant touch with employers of Draftsmen all over the U. S. We have placed hundreds of men in good, big-pay Drafting positions. We've made this training so complete, so practical, so easy to master, that our students **are bound to make good.** And so, because the demand for real Draftsmen continues to exceed the supply and because this training actually prepares men for good Drafting positions we back it **with a Free Employment Service.**

The American School

Dept. DC-33
Drexel Avenue and 58th St., CHICAGO

Lessons *Actually* FREE

learn at home in spare time!

Draftsmen Wanted!
$40 to $100 a Week!

70,000 fine jobs advertised last year. Get ready to fill one. Get out of the rut. Make something of yourself. Plan your future in Drafting. Even if you have only common schooling, even if you know nothing of Drafting, we guarantee to make you a real Draftsman *or to refund your money!*
Coupon brings complete information.

We Guarantee You A Job and a 50% Raise

American School
—the two Million Dollar Educational Institution

1. If you are now earning $30 a week or less, we guarantee to place you in a fine Drafting position, paying at least 50% more than you earn today —within 60 days after you finish the training, or money refunded.
2. Men earning over $30 a week are guaranteed SATISFACTORY training and employment service, or money refunded

Director Extension Work

Coupon Brings 3 Lessons FREE!

Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings complete information about your opportunities for success in Drafting. *Mail It Today!*

Read These Letters!

City of Chicago
Department of Buildings

Gentlemen: The same day I received my diploma I got word that I was one of the two candidates who had successfully passed the examination for Deputy Commissioner of Buildings of the City of Chicago, a position paying $5000 per year.

There were eight applicants examined besides myself, all men well known to the architectural and engineering profession. Seven of these failed to obtain a passing grade of 70%. My grade was 84.69.

Inasmuch as I failed to pass this same examination three years before my present success is mainly due to the knowledge gained through your School.

Yours very truly,
ROBERT KNIGHT.

Got His Draftsman's Job

"I wanted to let you know how I came out in getting that job at the Brownell Co., Dayton, Ohio. I was to start and have a test at Drawing, and I am still in the Drawing room. The engineer seems to like the work I make, and also the other draftsmen. I thank the school very much for getting me in at this place, because your letter of recommendation helped me a whole lot to get the job."

BERNARD WERNE,
730 St. Nicholas Ave., Dayton, O.

Liberty
High School
Bethlehem, Pa.

Dear Sirs:—This is to thank the American School for all that you have done for me since I signed up for the Drafting and Design Course.

In the eight years since then, I have gradually climbed from the position of tracer to that of Head of the Department of Machine Drawing and Design in our magnificent new $2,000,000 High School here at many times the salary which I received at that time.

The officials of the Pennsylvania State Department and Dr. Wm. C. Ash of the University of Pennsylvania all claim that our Course in Drafting and Design is the best ever being taught in the state. Every drafting graduate that we have turned out has proved successful, and one is now Chief Draftsman in a local steel concern. Yours sincerely,

J. S. LEAR.

Has Charge of Large Jobs

"Even before I had finished my course, I was put in charge of large construction jobs in different cities. I have been doing that ever since and the jobs are getting larger all the time. I owe my success to the American School because of the knowledge I gained in mathematics and calculations."

ELMER L. LAMB,
1308 South St., Peoria, Ill.

3 Drafting Lessons *Actually* FREE

Costly Library Books Loaned to Readers in Film Rolls

CONTENTS of the original copies of valuable books are being filmed by many libraries throughout the country and the rolls loaned out instead of the books themselves. The reader may then study the material by reflecting it on a screen by a tiny projector that is loaned with the rolls. A roll is placed in a machine turned at the reader's convenience by means of a tiny handle.

The type is magnified on the screen and enables a person afflicted with poor eyesight to read the contents easily. When one roll is completed, another is inserted in the machine and the story or article continued. The rolls are prepared in chapter form and are numbered consecutively.

Costly books have sometimes been lent out in the past only to be returned damaged beyond repair. By this new means, the original books may be kept preserved in the vaults of the libraries.

Produce 52 Different Commodities by Home Manufacture in Village

A SMALL Swedish village boasts no less than 52 different industries, all thriving and expanding. Some years ago the residents subsisted meagerly on agricultural products, but since the soil was extremely unfertile, the people were forced to find other means of livelihood. The neighboring bogs contained good iron ore, and smelting was therefore started on a small scale. This led to the beginning of the first industry—making wire. Since then the little hamlet has become the site of numerous home industries whose products are sold all over the world. Manufacturing is carried on by most of the residents. Among other articles made are wooden spools, leather goods, netting, wagon springs, mouse traps, brackets, and shoe pegs.

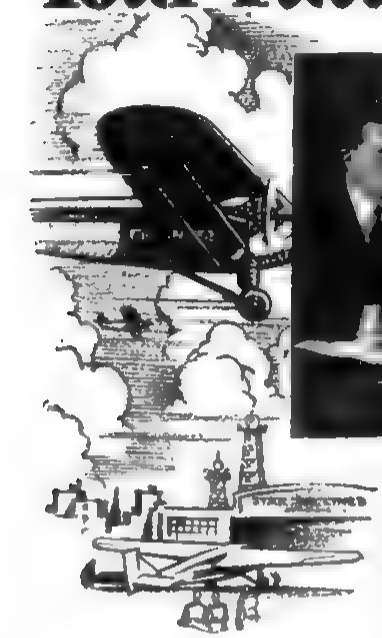
"So This Is America?"

THAT, or words to that effect, is probably what this young ostrich is thinking as he makes his first inspection of the world in a Los Angeles zoo. This nest of ostrich eggs shown at right was recently hatched by means of a special incubator that has been installed in the zoo. The artificial mother ostrich kept the eggs at an even temperature and brought the young birds out of their shells without any trouble. It was electrically heated and transferred the warmth of the ostrich's native land, Africa, to the zoo.

Sand-colored feathers provide a camouflage in a wild country.

How would you like a Half-Hour's interview with Walter Hinton about

Your Future in Aviation



HOW would you like to sit face-to-face with Walter Hinton and talk to him like this:

"Just what does Aviation offer ME?"

"How can I become a pilot?"

"What kind of 'ground jobs' are open?"

"What salaries are being paid?"

"What training is needed to get into the REAL MONEY class?"

"Why should I get into Aviation Now—instead of a year or two from Now?"

Would you like to put these and other questions up to Hinton? If you would, then send for "Wings of Opportunity."

Walter Hinton was

Pilot of the famous NC-4, the very first plane to fly the Atlantic, first Aviator to fly from North to South America, first to use a plane for exploration. During the war, he was one of the crack flying instructors for the U. S. Navy. 400,000 miles of flight are behind the training Hinton gives you.

Walter Hinton is

Training men today for big pay and real futures in jobs like these: Engineers, Designers and Draughtsmen, Pilots, Engine and Plane Mechanics, Riggers, Electricians, Welders, Instrument Makers, Plane and Motor Inspectors, Airport Operators, Radio Experts, Aerial Photographers, Transport Managers, Salesmen.

HINTON'S READY TO TALK TO YOU NOW

"Wings of Opportunity" is more than a FREE book. It's virtually a FREE interview with a world-famous aviator. In it, Lieut. Hinton gives you the answers to questions like those above and a lot more. He shows you why Aviation offers the BIGGEST OPPORTUNITIES that men of this generation will ever see—and why those who wake up, look ahead and act ahead NOW—will be the ones to CASH IN. Today, you have a chance to get into America's fastest growing industry on the "ground floor." It's a chance you certainly don't want to pass up without thought.

YOU MUST BE OVER 18

To take an active part in Aviation you should be at least 18 years of age. If you are under that, please do not ask for Lieut. Hinton's Book.

THIS IS EXACTLY WHAT HINTON IS DOING

Through a remarkable course of instruction—Hinton is preparing ambitious, far-sighted men right at home for wonderful opportunities in Commercial Aviation.

Whether you want a ground job or a flying job—you MUST HAVE training. And that's what Walter Hinton will give you.

Without sacrificing your present job or investing a lot of money, you can get Hinton's help. That means the ground work training, plus the FREE assistance of his Employment Bureau which is placing men in real jobs right along. "Wings of Opportunity" tells you how and why. Just tell us on the coupon that you're ready to listen.

Aviation Institute of U. S. A.
WALTER HINTON, President
1115 Connecticut Avenue, Washington, D. C.

Rush back to Washington!

Walter Hinton, President. 22-X
Aviation Institute of U.S.A.,
1115 Connecticut Avenue, Washington, D.C.
I want to know MY future in Aviation. Send my FREE copy of "Wings of Opportunity" quick.

Name .

Street . Age (Must be over 18)

City . State

Zero Hour!

A famous soldier-writer starts his first full-length novel in the August BATTLE STORIES. It is

The Doomed Platoon

By HAROLD F. CRUICKSHANK

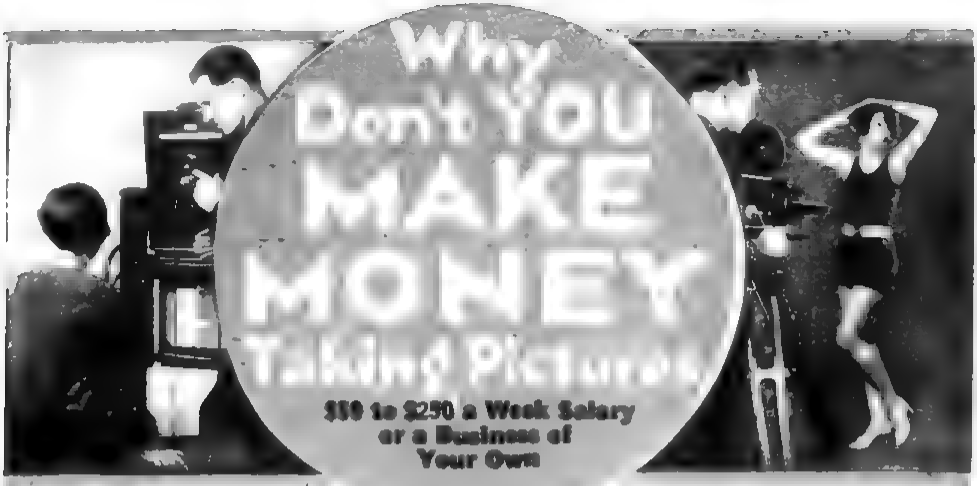
It is a vivid story of action at the front, written by one who knows his fighters. Start it in the August

The same issue contains a novelette by Arthur Guy Empey and intriguing yarns by other well known writers. Douglas Lurton contributes the dramatic true story of David S. Ingalls, the navy's one and only ace, now an assistant secretary of the navy for aeronautics.

Battle Stories Magazine

Mail $1 (bill or stamps) and BATTLE STORIES will be mailed you for five months. Address: Battle Stories Magazine, Fawcett Publications, Inc., 501 7th Avenue South, Minneapolis, Minn.

ON SALE JULY 10



Hundreds of Opportunities Await You in PHOTOGRAPHY

Find out what the "world's most interesting industry" offers you. A most fascinating career. Thousands of positions with big pay. You can have your own business; practically no capital is needed or you can make money in your spare time; there is no easier or more practical way to do it.

Choose Your Place in Portrait, Commercial or Motion Picture Photography

All branches offer splendid rewards. Do the work you like best. Portrait Photography is a field as wide as the world itself; Commercial Photography yields amazingly high prices for business pictures of all kinds; News Photography invites you to an adventurous career on a newspaper, the chance to travel; Motion Picture Photography is romance itself, with salaries running into hundreds of dollars a week in the great studios, and openings all over the world for newsreel work.

No Previous Experience Needed

You can easily get into this great industry. Even if you have never taken a picture before, you can quickly train to do the kind of work that brings big prices. You can learn at home, or in the New York studios of the world's foremost school of Photography. The training that has helped hundreds of others to success will open the door to your future.

We Furnish Camera With Course

Well-known experts give you practical training that enables you to start making money almost at once. You learn by doing, with an Outfit equipped to do professional work.

Earn While Learning—Free Employment Service

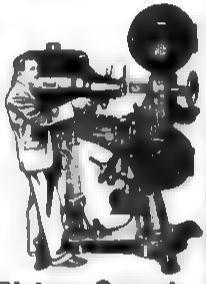
You can turn your spare hours into dollars even before completing your training. And when you are ready for a position, our Free Employment Service is at your disposal. Because of the standing of the Institute, it is called upon by many of the leading concerns in the industry to supply trained men and women for attractive positions.

FREE BOOK and Job Chart

It will pay you to investigate the great opportunities open today. An interesting illustrated book gives full details. It will be mailed to you without cost or obligation, together with Job Chart. Mail the coupon or write, now.

NEW YORK INSTITUTE OF PHOTOGRAPHY,
Dept. 153, 10 West 33rd Street, New York City

Earn up to $125 a Week as a



Motion Picture Operator

This may be the vocation you will like best of all. The pay is big in Motion Picture Operating and Projection—the hours are short and the work is light, clean and interesting. In moving picture theatres, vaudeville houses and wherever movies are shown, trained operators are required. Up to $125 a week is paid for only a few hours' work a day!

Let us tell you all about this profitable field and how you can learn Motion Picture Operating and Projection at home. Foremost experts teach you everything, from beginning to end.

Projector Given

To make your training thoroughly practical, a Projector is given to you with your training, without extra charge. Get the full details of this remarkable offer at once. Mail the coupon or write, NOW.

New York Institute of Photography
Dept. 153
10 West 33rd St.,
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Gentlemen: Please send me FREE your handsome Book and Job Chart telling the money-making opportunities in Photography in Motion Picture Operating and Projection. Also details of Free Employment Service and Outfit offers.

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Represent
THE DIRECT SELLING FIELD'S
Biggest Manufacturer of

DRESS SHIRTS
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BE serious with yourself—and figure what it means to represent *the Industry's Giant!*

Consider what you, yourself, can earn with such a company's line—even without any selling experience—and, even, if only in your spare time!

From the competition-proof prices of the several hundred custom-quality selections in your sample book Carlton Mills retains *only one* small share of the business profits . . . *the manufacturing profit!*

The rest is yours—*the lion's share*—in the form of immediate Big Cash Commissions—Double Weekly Convertible Cash Bonuses—Semi-Annual 40% Cash Profit Sharing. . . A limitless opportunity. Little wonder that Carlton gets the business and *holds* its representatives.

$1,000 Prudential Life Policy for You
NO COST TO YOU—NO MEDICAL EXAMINATION

Carlton Mills, alone, makes such an offer. Your very first sales activity as a Carlton representative wins you this *almost priceless* reward. Policies written by *The Prudential*—Premiums paid by Carlton Mills. No red tape, no "ifs". . . Just another outstanding example of Carlton Mills' leadership. Thru this $1,000 Prudential Life Insurance Policy Carlton Mills guarantees you *"A Protected Future as Well as a Prosperous Present!"*

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NO Substitutions—Every Style Carried in Every Size. It Takes a Million Dollar Stock To Guarantee This Rigid No Substitution Policy.

Lowest Competition-Proof Prices through Gigantic Volume Sales.

Tremendous Variety Assures Perfect Selection and Genuine Satisfaction.

DISTRICT MANAGERS
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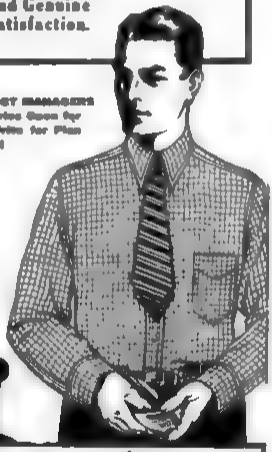

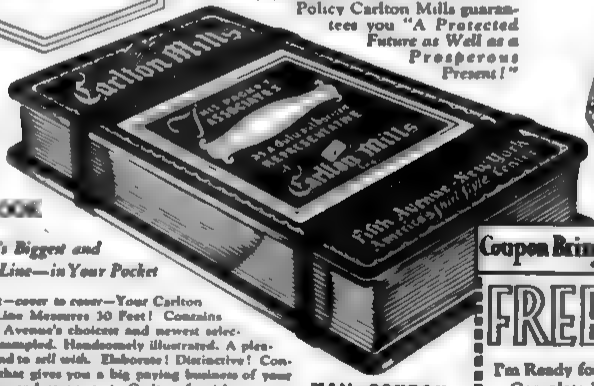

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I'm Ready for Real Business—Send Me the Complete New Carlton Sample Outfit.

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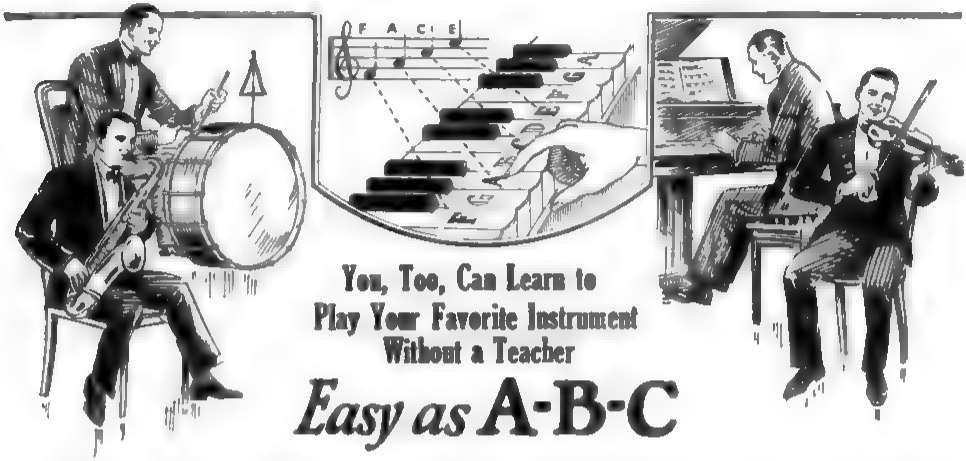
114 FIFTH AVENUE NEW YORK

Half a Million People
have learned music this easy way



You, Too, Can Learn to Play Your Favorite Instrument Without a Teacher

Easy as A-B-C

YES, half a million delighted men and women all over the world have learned music this quick, easy way.

Half a million — 500,000 — what a gigantic orchestra they would make! Some are playing on the stage, others in orchestras, and many thousands are daily enjoying the pleasure and popularity of being able to play some instrument.

Surely this is convincing proof of the success of the *new, modern method* perfected by the U. S. School of Music! And what these people have done, YOU, too, can do!

Many of this half million didn't know one note from another—others had never touched an instrument—yet in half the usual time they learned to play their favorite instrument. Best of all, they found learning music *amazingly easy.* No monotonous hours of exercises—no tedious scales—no expensive teachers. This simplified method made learning music as easy as A-B-C!

It is like a fascinating game. From the very start you are playing *real* tunes, perfectly, by *note.* You simply can't go wrong, for every step, from beginning to end, is right before your eyes in print and picture. First you are *told* how to do a thing, then a picture *shows* you how, then you do it yourself and *hear* it. And almost before you know it, you are playing your favorite pieces—jazz, ballads, classics. No private teacher could make it clearer. Little theory—plenty of accomplishment. That's why students of the U. S. School of Music get ahead *twice* as fast—*three times as fast* as those who study old fashioned, plodding methods.

What Instrument for You?

Piano	Piccolo
Organ	Hawaiian Steel Guitar
Violin	Drums and Traps
Clarinet	Mandolin
Flute	Sight Singing
Harp	Trombone
Cornet	Piano Accordion
'Cello	Voice and Speech Culture
Guitar	Automatic Finger Control
Ukulele	
Saxophone	
Banjo (Plectrum, 5-String or Tenor)	

You don't need any special "talent." Many of the half million who have already become accomplished players never dreamed they possessed musical ability. They only wanted to play some instrument—just like you—and they found they could quickly learn how this easy way. Just a little of your spare time each day is needed—and you enjoy every minute of it. The cost is surprisingly low—averaging only a few cents a day—and the price is the same for whatever instrument you choose. And remember you are studying right in your own home—without paying big fees to private teachers.

Don't miss any more good times! Learn now to play your favorite instrument and surprise all your friends. Change from a wallflower to the center of attraction. Music is the best thing to offer at a party—musicians are invited everywhere. Enjoy the popularity you have been missing. Get your share of the musician's pleasure and profit! Start now!

Free Booklet and Demonstration Lesson

If you are in earnest about wanting to join the crowd of entertainers and be a "big hit" at any party -if you really *do* want to play your favorite instrument, to become a performer whose services will be in demand—fill out and mail the convenient coupon asking for our Free Booklet and Free Demonstration Lesson. These explain our wonderful method fully and show you how easily and quickly you can learn to play at little expense. The booklet will also tell you all about the amazing new *Automatic Finger Control.* Instruments are supplied when needed—cash or credit. U. S. School of Music, 2628 Brunswick Bldg., New York City.

U. S. School of Music,
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Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane, Free Demonstration Lesson, and particulars of your easy payment plan. I am interested in the following course.—

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City..... State

This "Crazy Scheme" Made Me Independent

Learn the secret of my success. Be a Real Estate Specialist. Start at home in spare time. Use my successful system. Free Book shows how.

"IT'S a crazy scheme," said some of the old-time real estate men. But with this "crazy scheme" I made a net profit of $100,000 in less than five years—enough to make me independent for life.

So, no matter where you live, or what you are now doing, or what your sex or present age may be, if you want to learn all about my "crazy scheme"—if you want to do as I did—if you want to make big money—right at home—in your spare time—mail coupon at once for a free copy of my beautiful, new, illustrated book, which contains the biggest and best money-making business opportunity you ever heard of.

A well-known cartoonist's conception of my idea.

Use My Money-Making Method

When I started in real estate, I turned my back on all the ancient, threadbare, moss-covered methods of the past, and used a simple, scientific system of my own which is as far superior to the old-time methods as the radio is superior to the old-style music box.

With little education—no real estate experience, no money, no pull, I started a new kind of real estate business which met with overwhelming success.

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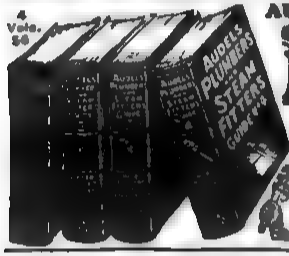

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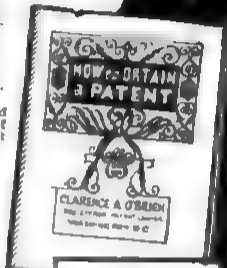

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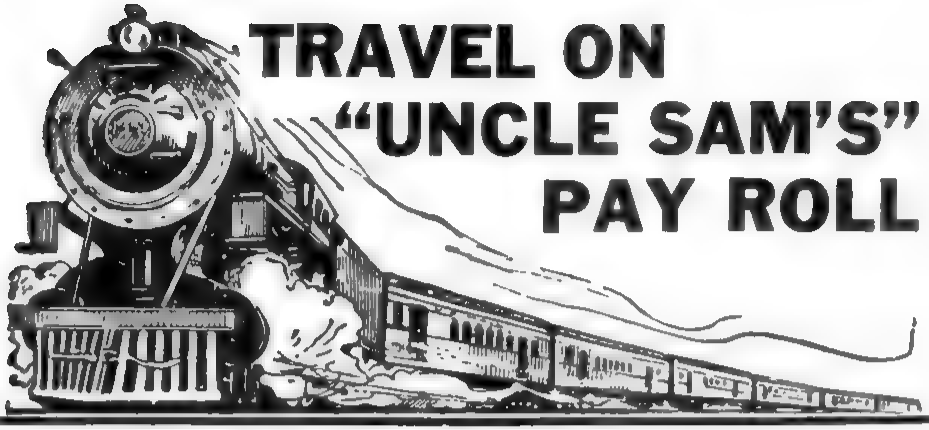

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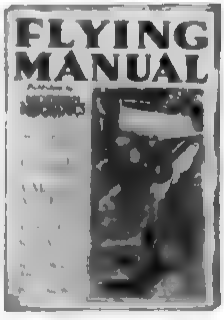

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Here is How I Used to Look

I was just as bald as this picture. It is a true photograph without any tampering or retouching. It is exactly like I used to look. Then look at the full head of hair I have in the picture on the left!

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Plane Drops Motor in Case of Fire, Then Lands as Glider

Danger of fire breaking out in an airplane engine in flight gives promise of being eliminated by the perfection of a new method of mounting motor and gas tanks which permits them to be dropped from the fuselage of the plane in case of fire. Joaquin Abreu of San Francisco is the inventor of the new motor-mounting device. The photo below shows how the mechanism is attached to a frame underneath the plane, from which it can be dropped at an instant's notice by simply moving the release lever. After the motor has been dropped, the plane lands easily as a glider.

BREAKING NEW RECORDS

An Editorial

EVERYONE seems to be setting a record. It is a great American pastime.

But what's the practical good of flying across the Atlantic, keeping a plane in the air longer than anyone else, running the fastest train, swimming farthest, sprinting fastest, "setting a record"?

No good at all if it doesn't prove something really worth knowing. That is the test to apply to the worth of a record.

If a plane sets a new mark for sustained flight, engineers learn what part failed first under service conditions. They can remedy the weak point. Future planes, future flyers, will profit by greater stamina, higher safety.

If a man runs faster than any mortal ever ran before, it shows what the human body is capable of with proper coaching. As an example for others, the athlete's life will prove a model of health-building or a warning against overstrain.

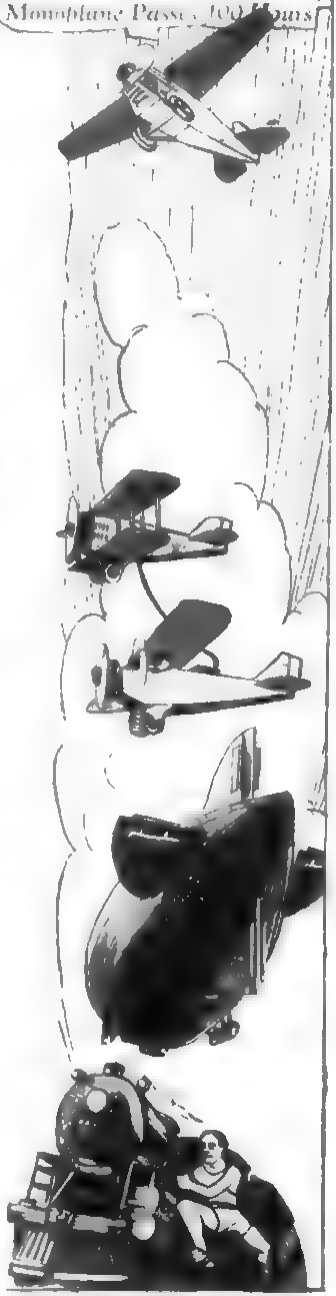
Every new record tells us something. It may be a fact about human endurance. It may concern the fatigue point of metals. It may be a monument to patience, care, human exactitude, courage.

The setting of a record typifies the spirit of man's conquest of Nature, the will to know and to subjugate.

Let 'em set records! Whether the fallen mark is a globe-circling flight or a peanut pushing contest up Pike's Peak, little but good can result.

It is good for us to laugh at soporific stunts—good to appreciate the lessons of epochal contests.

Modern Mechanics is for bigger and better records!



Every day old records fall!

UNDER *the* POLE *in a*

"The greatest adventure in the world"—no milder sentence than this can adequately describe the daring plan of penetrating beneath arctic waters in a submarine, as set forth in these pages by Capt. Sir Hubert Wilkins, the famous Polar explorer who conceived the idea. Perilous and fantastic as the scheme sounds, the odds against the daring adventurers are not so formidable as the layman supposes.

That there is a practical purpose to be served by proving that Polar waters can be navigated by submarine is demonstrated in the drawing at the left, in which the route from Seattle to New York via the northwest passage is marked. Ever since the discovery of America, explorers such as Hudson and Cabot have sought a mythical northwest passage, but it remains for the submarine to demonstrate that the route is practical.

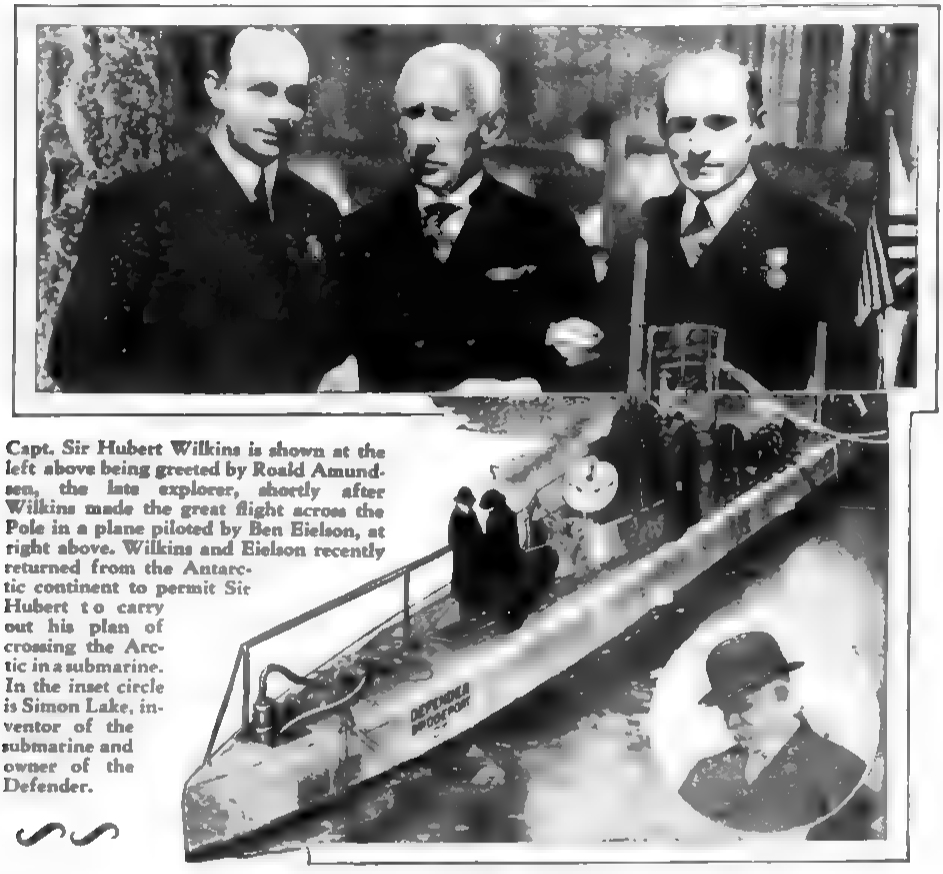
AIRSHIPS and airplanes have conquered the arctic air, but steamships have not conquered the arctic ice. Within a hundred years two hundred or more ships have been lost in battle with the grinding pack ice. They have been caught in the arms of the merciless floes, and, splintered and crushed, have dropped into the maw of the arctic basin. Many brave crews have followed their mangled ships to the bottom of the Arctic ocean. A few, more fortunate, more experienced or cautious, have escaped to tell tales of misfortune, hardship and privation.

No surface ship can push its way through the tough ice pack or withstand the pressure of the weighty wind-driven floes. Not even the sturdy ice breaker, Krassin, with its marvelous mechanical aids, which crashed its way through the edge of the pack to rescue Nobile and the Italia's crew, could expect to conquer the mid-arctic ice or make a trans-arctic journey.

Statesmen and business men have for years sought a shorter sea route from Europe to Asia, from Alaska to Florida, from Seattle to New York and other places. By using the arctic route the distance be-

Submarine

by CAPTAIN SIR HUBERT WILKINS
famous Polar Explorer



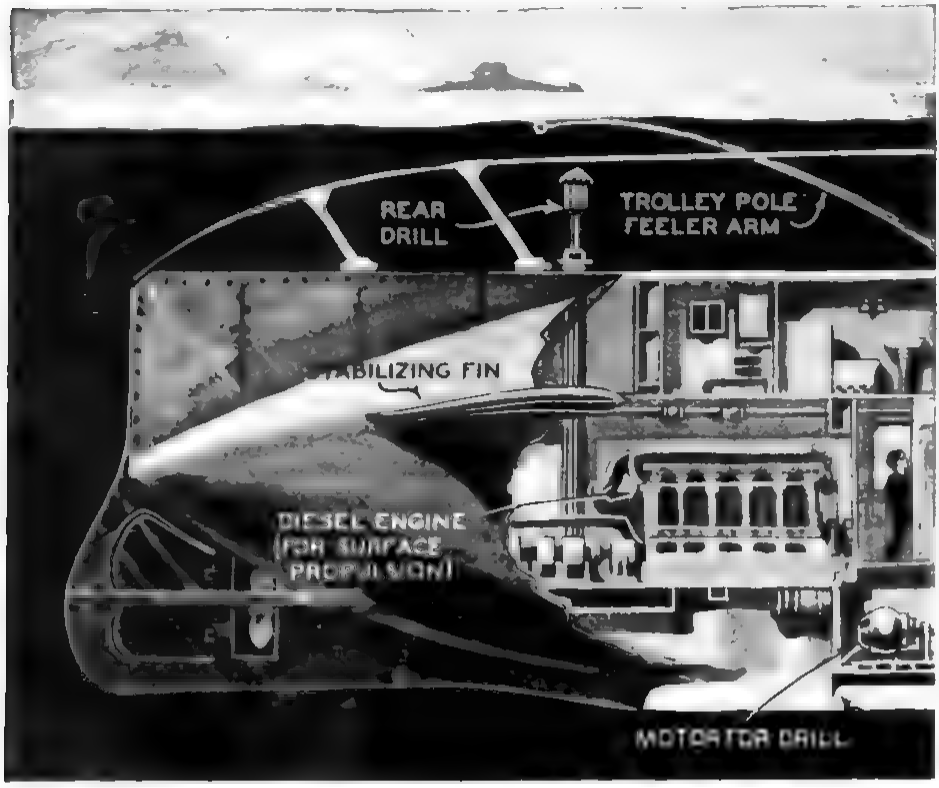
Capt. Sir Hubert Wilkins is shown at the left above being greeted by Roald Amundsen, the late explorer, shortly after Wilkins made the great flight across the Pole in a plane piloted by Ben Eielson, at right above. Wilkins and Eielson recently returned from the Antarctic continent to permit Sir Hubert to carry out his plan of crossing the Arctic in a submarine. In the inset circle is Simon Lake, inventor of the submarine and owner of the Defender.

tween these places would be shortened. It is very much shorter from Seattle to New York via the Bering Straits than it is via the Panama Canal.

But the search for a navigable northwest or northeast passage has so far been in vain. It has cost hundreds of lives and millions of dollars. Men in ships have circumnavigated the Arctic ocean, yet a practical route for surface vessels has not been found. The potential value of a northwest passage is still as great as it ever was, but those of us who know the arctic do not believe that a surface route is practical.

With mechanically perfect machines, Byrd and Amundsen and Eielson and I have proved that flying machines can make use of the shorter arctic route and by flying over a great circle course shorten, by nearly fifty per cent, the time and distance of travel between northern towns. Passengers will soon fly over the arctic as safely as they now fly over Death Valley and the snow clad high Sierras, but sea-going vessels will be needed to carry the heavy and bulky loads of grain from the fertile areas in northern Russia, Alaska and Canada which will be produced as soon as some safe economic method of transporting it is introduced. Modern mechanics have

Cross - Sectional View of Submarine Shows Interior Arrangements



Interior arrangements of the Polar submarine as designed by Capt. Wilkins are illustrated in the drawing above. The feeler arm and the protecting runner or "skate" over the hull are intended to keep the vessel at a safe distance below the ice. Chemicals will also be carried to melt the ice.

helped us in flying over the arctic ice. Years of experience have proved that we cannot expect to conquer the ice itself so we look to modern mechanics to aid us in avoiding the ice and conquering the arctic sea.

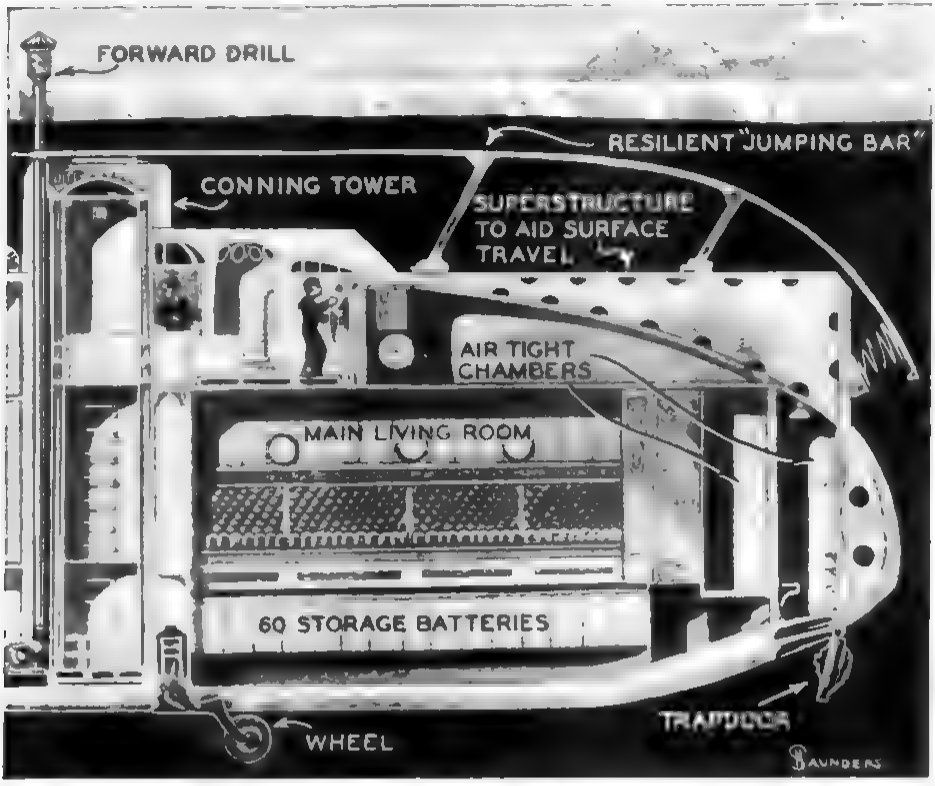
Submarine Is the Solution

The economic possibilities of the submarine are as yet little understood. As cargo carriers they could open up routes of importance to every country in the northern hemisphere. The distance between Liverpool and Yokahama via the arctic is 6,750 miles as compared to 12,250 miles via the Panama and 11,100 miles via the Suez Canal. For vessels of equal size and speed the saving of time on the arctic route would be more than sixty days on a round trip and the earning power of the northern vessel would be a hundred per cent more than the other.

Submarine hull construction has improved very little since Simon Lake in 1883 built his first commercial submarine, but modern mechanics have been applied to the propulsion and operation of the vessel. Heavy duty Diesel engines have taken the place of steam and light, high-speed gasoline motors. Electric batteries have been improved to give long service and admit a comparatively rapid re-charge. Some military submarines now in operation have an independent cruising range of more than ten thousand miles.

The size of a submarine is not more limited than the size of a surface vessel and, as a matter of fact, their economic efficiency increases with size within certain limits. Plans for a thirteen thousand ton

Drills, Feeler Arm, Hull Runner Protect Vessel from Serious Damage



The double drills shown in the drawing will permit holes to be bored through the ice, even though it is as much as fifteen feet thick. "Breathing tubes" can then be run through the holes to admit fresh air and permit the Diesel engines to be run, charging batteries for under-surface propulsion.

submarine have been drawn up and approved. It would be possible to build them even larger. Such submarines would naturally not go directly across the Arctic ocean, but skirting along the comparatively ice free coastal water, would submerge to pass the solid strips of ice which would stop the progress of a surface vessel.

It would, nevertheless, on a voyage of discovery, be possible to go "beneath" the north pole and across the Arctic ocean. It may seem to the uninitiated that there are certain insurmountable difficulties in the way of under-ice navigation, but a close study of the conditions proves it to be easily possible to avoid the dangers and overcome all the difficulties. In the first place the arctic temperatures in summer are well above freezing point. The submarine would operate in water of more or less constant temperature. Insulation of the walls of the submarine decreases condensation and by keeping the interior as cool as possible no inconvenience would be experienced through dampness in the vessel.

Modern submarines can submerge to a depth of three hundred feet. Nansen in his description of his arctic drift states that he did not see ice more than fourteen feet under water. Peary and Stefansson claim that they have never seen ice aground in water more than a hundred and twenty feet deep. There are no large icebergs in the Arctic ocean. The icebergs found in the north Atlantic come from the southern part of Greenland.

The arctic, even in the depths of winter, is not covered with an unbroken blanket of ice. Amundsen in the early spring of 1925

landed his flying boats in water within ninety miles of the pole. It has been observed by those who have in late winter and spring flown thousands of miles over the arctic pack that there are open leads or newly frozen water in patches within twenty-five miles of any given point in the Arctic ocean. It is our belief that in late summer we could on a trip from Spitsbergen to Bering Sea, or vice versa, travel fully twenty-five per cent of the way in open water.

gency. The Lake type of submarine we propose to use is fitted with one of the most important safety devices. That is two adjoining airtight chambers, the bottom of one, being part of the bottom of the vessel, being a hinged door. This affords a means of leaving the submerged vessel in a diver's suit and effecting repairs or doing work outside the vessel.

The manipulation is simple. The chambers are filled with air to a pressure equalizing the pressure of the water on the out-

What if Wilkins' Submarine Gets Stuck Under the Ice?

The above question is the first one which occurs to one when reading of Capt. Wilkins' daring plan for sub-arctic travel. Several devices will prevent such a catastrophe. Two drills extending upward from the submarine will bore through surface ice. A charge of explosive can be attached beneath the ice by divers from the vessel, and a hole shattered. Thermite, a chemical which generates intense heat, can be employed to melt a hole through the ice.

It would appear to be possible to come to the surface in ice-free water at least every thirty miles, but strange as it may seem, that fact would possibly present our greatest danger. The arctic ice is frequently if not always in motion. An open lead is ever changing its shape and size. It may disappear at any moment. An under-ice vessel would have to be prepared to make the whole of the journey under ice if necessary. Yet no one would dream of making a non-stop submerged trip across the two thousand miles of the Arctic ocean.

Modern submarines are operated on the surface by Diesel engines. Submerged, they are driven by electric motors and batteries. With one full charge the vessel can operate at a certain speed for a limited time; then the batteries must be recharged. The greater the speed the quicker the power of the battery is expended and experience has proved that an economical speed for submarines submerged is about four or five miles an hour. This slow progress is a means of protection in submarine exploration. With suitable buffer arrangements small submarines could run full speed ahead into a solid obstruction and sustain no damage.

Naturally, in preparing for a submarine trip such as I propose for the summer of 1930 we would provide for every emer-

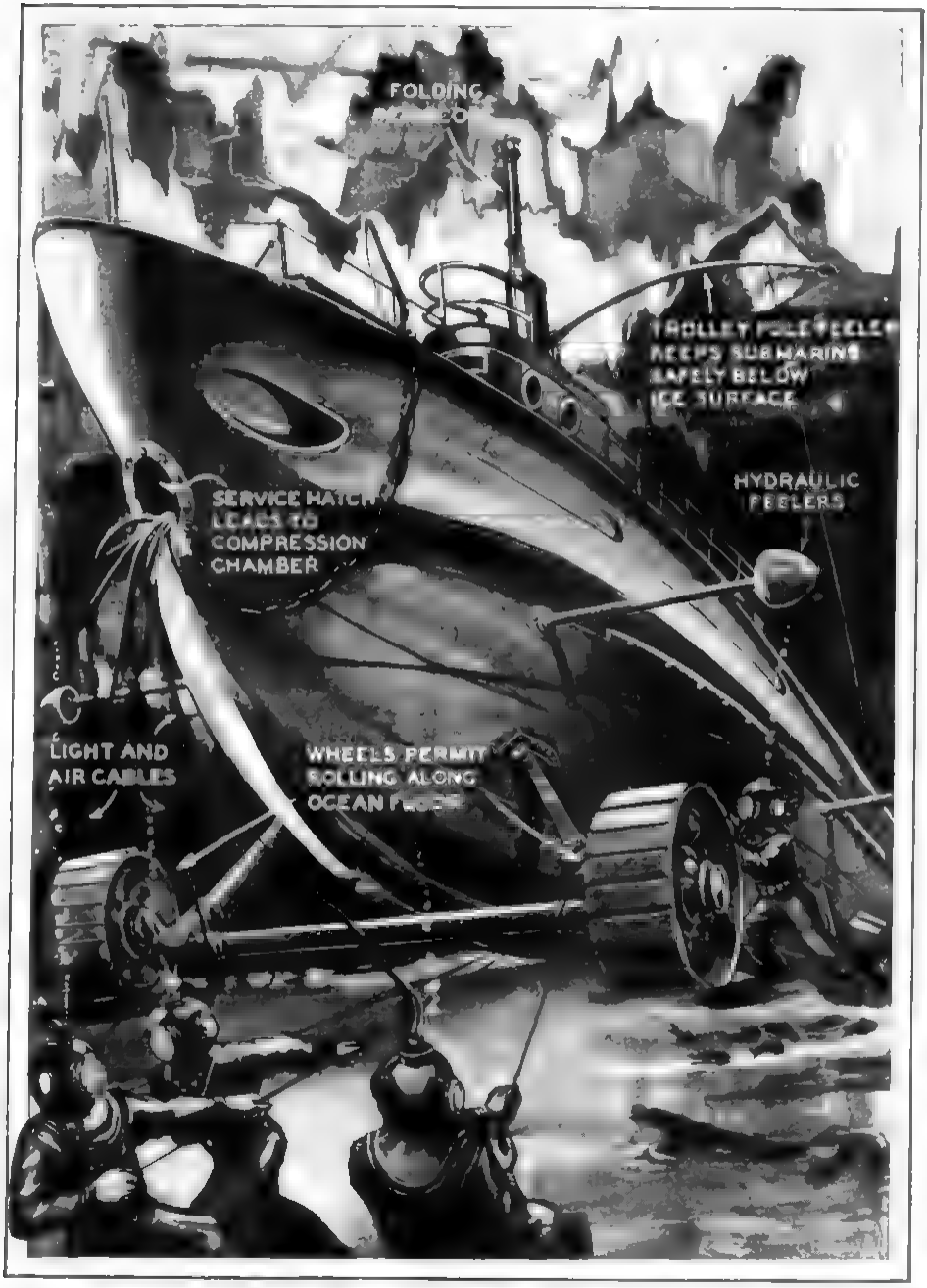
side. The pressure at depths to a hundred feet is not oppressive to humans. The men can then open the floor of the submarine and step into the water and, carrying an air line and a guide rope, move freely about at their work. It may be that a propeller blade will need replacement or a minute investigation of the under surface of the ice be made; even a sample of the sea bottom in shallow water could be collected.

This device will also serve in several methods of gaining access to the open air if it is found necessary to break through the ice. The diver can attach explosives to the bottom of the ice, then re-enter the submarine, move away to a safe distance and follow a guide line back to the place after the explosive has done its work.

A diver with freedom of movement on top or near a submarine could manipulate a chemical agent such as thermite or calcium carbide and melt a hole through the thin sea ice. While the ice may in parts be fifteen or more feet in thickness, in late summer we believe it possible to find ice less than three feet thick. Much less force will be required to burst the ice from the bottom than from the top, and in summer, when the water temperature is well above freezing, little extra temperature will be

(Continued on page 166)

An Air-Tight Chamber in Submarine's Bow Permits Divers to Emerge



This artist's conception of under-sea travel in Arctic waters gives a graphic picture of conditions which will be encountered, and of the mechanical steps which can be taken to combat them. Men can emerge from the vessel in divers' suits to make emergency repairs or investigate conditions.

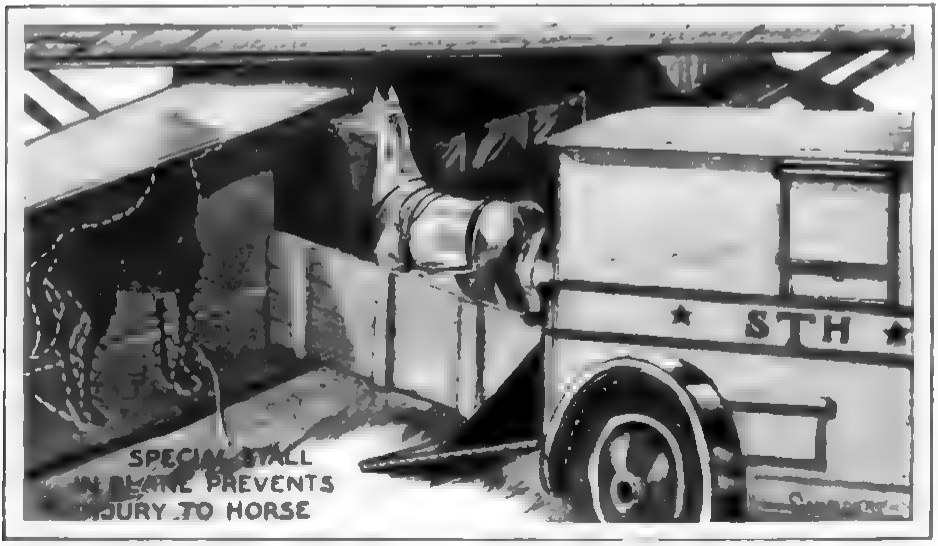
Moving Animals of the Circus

How valuable race horses and circus animals are transported from one place to another in record time. Airplanes, ships, trains and huge motor vans are used to carry captive beasts to site of next performance.

"CLOSING in Chicago August 3rd. Opening in New York August 5th. Two weeks later, August 19th, opening in London....." So runs the schedule of a circus booking agent. And in these few scribblings in his notebook is entailed the most picturesque phase of circus life.

Moving circus equipment, with its bulky tents, large wagons and cages, diving pools, ferris wheels and electric generating plant, is difficult enough in itself. But the task of transferring ferocious lions and tigers, monstrous elephants, long-necked giraffes and the hundreds of other beasts that accompany a show is a real one. Likewise, moving immensely valuable race horses from one derby to another without injury to the horse is a problem in which trainers and owners are vitally interested.

A circus or carnival moves into town. It stays several days or a week or two. Crowds



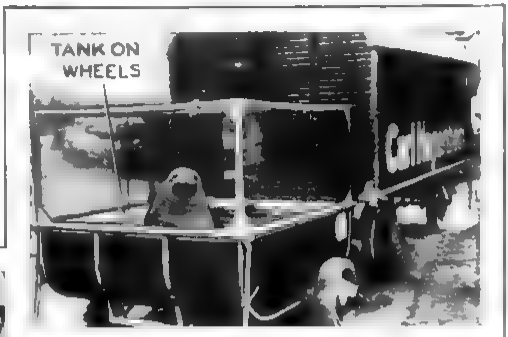
Moving race horses by airplane is being tried by many owners. So far, it has been very successful.

and Race Track Overnight

throng its shows the final night, and before the last person is off the grounds, crews of workmen begin tearing down the tents in preparation for departure to another city.

Working in the spraying beams of huge searchlights, they are finished in a remarkably short time. The canvas is rolled into bundles, the stakes are ready for shipment, the wagons and heavy cages are given a final inspection. Through all of it, the elephants of the troupe have been doing their bit. Hauling huge tent poles, lifting, pulling, tugging, they are indispensable in the operations. They are the tractors of the circus.

A chorus of bellows, whinnies, grunts and roars greets the train as the animals are led or lifted into their special cars. The engine whistles and is gone.



When sea-elephants travel, they demand a rolling bath—and get it. This tank on wheels, shown above, is for that purpose. Airplanes are used to transport valuable silver foxes. Each fox is placed in a small wicker cage. Giraffes must be carried in high containers that afford plenty of room to stretch their necks.

Next morning residents of the town passing the site where gay flags and bright-colored signs and posters had been displayed, see only the bare spots worn into the green turf where the tents had been pitched. Scraps of paper litter the ground, and hay is scattered about here and there. The circus has moved on and is at that moment probably being put up again in a distant city.

Circus moving in the early days was a tedious and dangerous job. Today, while it is still a difficult problem, modern means of travel and adoption of new types of equipment make it much easier—and faster.

When schedules call for a booking across the ocean, more intricate problems ensue. Special quarters are provided for the animals aboard ship, and huge derricks are used to lift and lower the larger animals to and from the boat. A harness fits around their bodies and the big arm moves them about as if they were mere inanimate packages.

A new wrinkle has recently been demonstrated in moving race horses. They are usually taken from one track to another by train, but transport airplanes have been found to be just as safe and far faster.

A special stall is constructed in the body of the plane, and the horse is hobbled and tied firmly in a frame that holds his head and neck up and prevents him from moving about.

The MECHANICS of GOLF

by Walt Raschick
Golfing Expert

Become firmly versed in the fundamentals of your swing and the grand old game will cease to vex you; timing and weight distribution solves whole problem.

"SIMPLE business—this game of golf!" That's what the average non-player thinks about this popular sport—a mere matter of knocking a ball about a field, making it roll into nine or more holes in the ground in the least possible number of "knocks."

But—and it's a big *but*—there's a real science behind every one of those "knocks." Any man can swing a golf club in his hands and imagine that he is doing the thing correctly, but it takes a thorough study of the mechanics of the stroke before he can swing the club in a manner that will insure the maximum amount of effectiveness.

Perhaps the most familiar mechanical aspect of golf is that concerning the spin of the ball. There is Jones who slices his ball, Smith who hooks his ball, and Brown who tops his ball. Jones' ball goes to the right, Smith's ball goes to the left, and Brown's ball doesn't go at all—it dives into the ground and stays there. All of these faults come under one category—spin of the ball.

To understand this matter of spin, consider this basic rule of golf: The clubhead must follow through in a straight line for four or five inches after the ball has been struck, this straight line to be in the exact line in which you wish the ball to travel. Now, if the player pulls his club to the left of this straight line, as shown by the heavy arrow in Fig. 1, he will impart a clockwise spinning motion to the ball, as shown in the sketch. What happens is that the ball goes to the left following the sweep of the club head, but once the initial impetus is lost, the spin causes the ball to "break" and fly off to the right and into the rough. There you have the "sliced" ball.

The "hooked" ball is the exact reverse of this—the club head in this case swinging away from the body, as shown by the heavy arrow in Fig. 2, thereby imparting a counter clockwise spin to the ball which carries it off to the left.

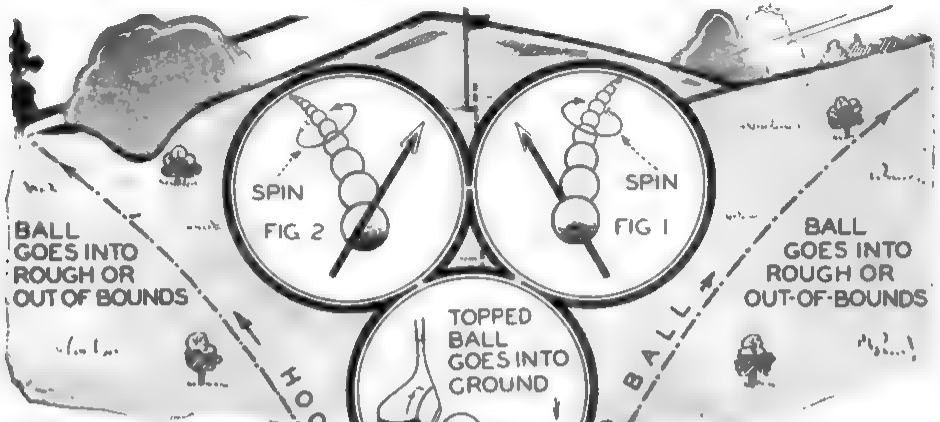
Fig. 3 pictures the "topped" ball—familiar to every beginner. In this case, the club does not get under the ball sufficiently. This topping or half-topping of the ball results in a downward spin similar to the baseball pitcher's "drop," and the ball immediately becomes grounded or else travels for but a short distance.

Most cases of hooked, sliced or topped balls are the direct result of poor balance or timing, and any player who will correct the body pivot, will, in most cases, also correct his tendency towards slicing, hooking or smothering the ball.

Any number of mechanical features must be taken into consideration. Take, for example, this matter of "timing:"

A good method of picking a golf club suited to your individual use is pictured above. If the club can be swung easily with one hand without tiring, it is of the proper weight.

Drawing Shows Course Taken by Golf Ball When Improperly Driven



When the ball flies off to the left or right of the desired line of flight, it is the result of a hooked or sliced drive. Drawings herewith illustrate how the undesired spin of the ball causes it to "break" like a pitcher's curve.

"Topping" the ball causes it to spin down into the ground so that it travels only for a few inches. Poor balance or timing, which can usually be corrected, is the cause of topping, slicing, and hooking.

Did you ever watch a boxer deliver one of those smashing blows which meant the K. O. to his opponent? That particular blow was delivered by the gloved hand—but the hand was actuated by the arm, the arm was assisted by the shoulders, the shoulders coordinated with the heavy back muscles, and we finally find the knockout punch starting with the muscles in the boxer's feet.

The same principle applies to golf. It is the hands and wrists which deliver the stroke, yet the action of the whole body—arms, shoulders and legs—is so timed that the maximum strength of these muscles is in play when the club head meets the ball.

So . . . in order to get a maximum drive, there must be proper timing between all of the muscles which can be used in the drive. Before you start this study of timing, however, consider the weight of the club. A good boxer would be "way off" if he fought with a heavy lead weight in his glove; a good golfer is seriously handicapped when he plays with an unduly heavy or light club. A good test is to hold the club loosely, and then waggle it back and forth using either hand. If you can move it freely and without tiring your wrists, the weight is about right.

Now for the swing. In the "movies" on page 49, note how Bobby Cruickshank faces the ball at the tee. Although a small man, Cruickshank gets terrific power behind the ball, due to the perfect co-ordination of all body muscles. He shifts his weight from one foot to the other, or brings it squarely on both feet, (as when he brings the club down from the peak of the backswing) as the occasion requires. His pivoting is a thing of beauty, resulting in shots placed perfectly down the center of the fairway.

With his right arm held straight, the "follow through" is accomplished with consummate grace and skill. Bobby Cruickshank is one of golfdom's most colorful figures. His play is always a thrill to spectators, and the novice can gain a world of knowledge from careful observation of him on the links. "Wee Bobby" has long been one of America's leading pro's.

Duncan, English Pro, Gets Uncanny Accuracy with Irons

George Duncan here shows the exact position of the club and the player at the top of a swing in a full iron shot.

With the left arm still straight in the downward drag, the right wrist begins to come into action for the "punch."

Getting ready to give it all he has! The right shoulder is squared around, the right arm is stiffened and—pung!

George Duncan, the accomplished British professional, is noted particularly for his iron play, both as to the length and the almost uncanny accuracy of his shots. In the accompanying flashes from a movie strip of this great player, the duffer may ascertain how Duncan gets his excellent results with clubs which at best are fickle.

Particularly in the first picture must the golf novice take note. Here Duncan rests his weight almost entirely on the right foot, as his club reaches the peak of his backswing for a full iron shot. In a split second comes the transference of weight from the right foot, to a perfectly equal distribution on both feet. In this latter situation, as depicted in the second picture, the player, in switching distribution of weight, simultaneously brings the right wrist into action for the "punch" soon to come. The left arm here is still straight, a feature insisted upon by orthodox golfers and by most of the top-notchers. Styles, however, vary, and one needs only to be reminded of such aces as Diegel, Mehlhorn and Von Elm to appreciate that stereotyped methods do not always produce best results.

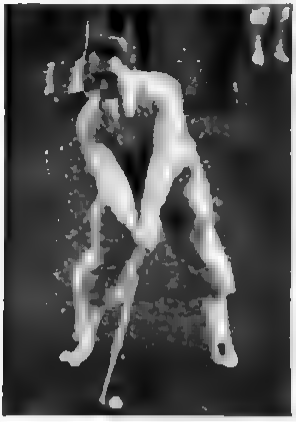
Duncan's grace and symmetry of motion are nicely brought out in the third picture, which shows a further step in the progress of the clubhead toward meeting the ball. Here the right shoulder is squared around, the right arm stiffens and the player prepares to give the ball "all he has," yet without pressure. Pressure is to be sedulously avoided, yet there must be a mighty power behind each shot—in a word, it is, after all, the ability to punch the ball toward the green with a well defined power, rather than a spasmodic burst of too much or too little force, that results in the nice distinction between the expert and the duffer.

It has been said that Horton Smith, latest meteor in the golfing heavens, is weak on pitch and chip shots, but the truth of the matter is that the young Joplin player's game is so nearly perfect that seldom is a chip or pitch shot necessary. He usually manages to find the green in par strokes, with only infrequently finding occasion to reach for a niblick or a pitcher.

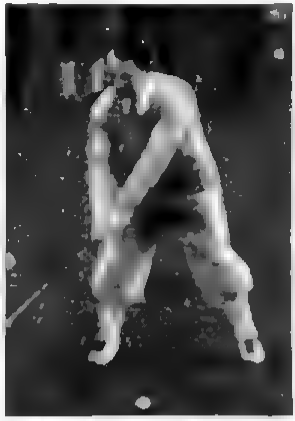
It is well for the novice in golf to disregard freely given advice from every Tom, Dick and Harry. He will profit materially if he models his game on that of an established star whose style in turn is based on sound fundamentals.

Then, practice is necessary and then, *more practice*. The old axiom: "Practice makes perfect" never applied to anything as truly as it does to the royal and ancient game. Watch how the acknowledged masters of the pastime do it—study their faults and virtues—discriminate closely, then work out your own style, based upon the best that the masters can offer. And if you will remember to practice faithfully, Old Man Par will find a tough time in store for him when you meet him on the links.

Colorful Figure of Cruickshank Teeing Off For 36 Holes



Start of Cruickshank's powerful swing.



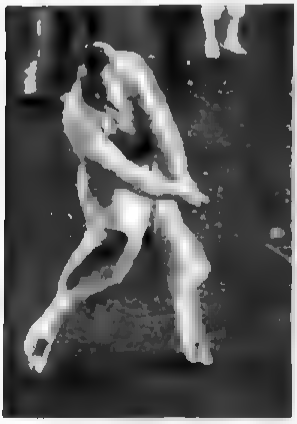
Weight is shifted to right foot.

Club at top of back swing.

Weight swung back to left foot.

Power of swing kept under control.

Position of hands at moment of impact.



Smooth drive from right shoulder.

A perfect exhibition of pivoting.

The completion of a beautiful drive.

Lion Talks on Air—Fans Adjust Sets to Find Trouble

RADIO fans tuning in on a Los Angeles broadcasting station recently thought something had gone radically wrong with their sets when Leo, trained lion of one of the city's zoos, announced himself into the microphone.

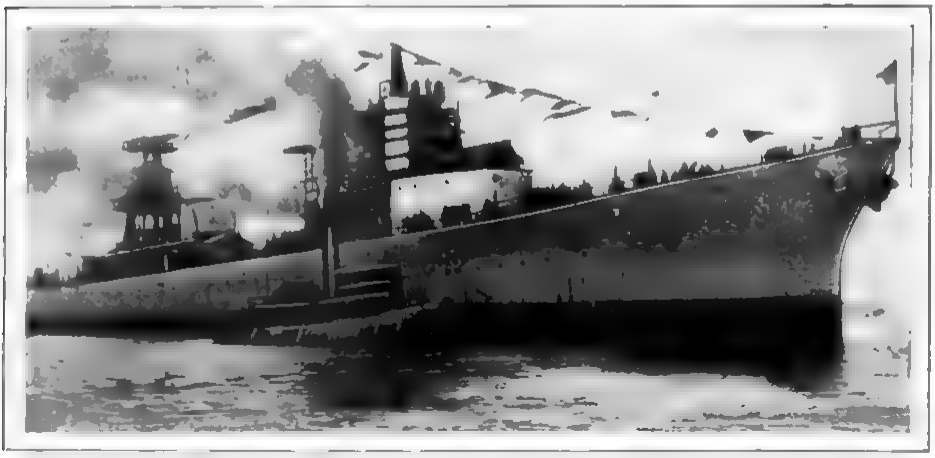
It was a great occasion for Leo and he made the most of it. Trying to trace the trouble, fans discovered its source when the regular announcer explained that the series of roars and growls that had been transmitted through countless loudspeakers was only Leo giving a little talk. They breathed a sigh of relief and even smiled when Leo insisted on saying a few more appropriate words before being cut off the air—for they realized that the sending studio was far away and plenty of space intervened to make smiling safe.

Natives Give Away Property and Prepare to Die as Moon Blots Out Sun

WHILE scientists in five of the largest observatories in the world were obtaining valuable data on the recent eclipse of the sun during May, natives in the Philippine islands were giving away all of their earthly possessions at the last minute in preparation for the end of the world. Shortly after noon on May 9 the moon slipped between the sun and the earth. Light grew dimmer just as though the sun were setting at the start of evening. Complete darkness lasted for 13 minutes.

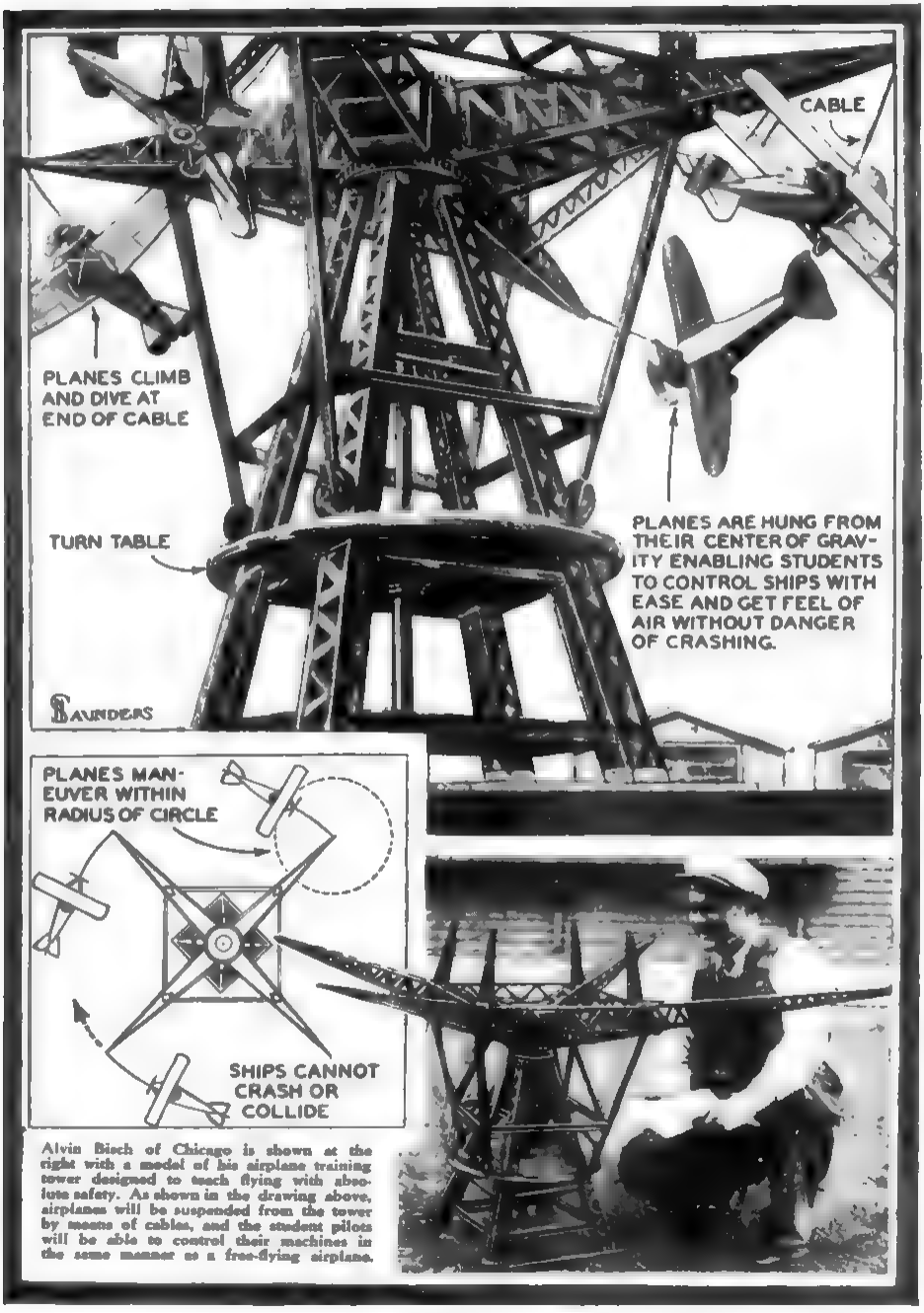
Latest U.S. Cruiser Under Disarmament Treaty Launched at Navy Yards

THE U. S. *S. Pensacola*, a new cruiser with an historic name, is shown below after having recently been launched at the Brooklyn Navy yard. It is the latest ship of this type and the second to be built in accordance with the Washington Naval Disarmament Treaty. Measuring 585 feet in length, the ship has a 65-foot beam. A crew of 530 men is carried, and palatial quarters are provided.



Four anti-aircraft and ten eight-inch guns are mounted on the decks of newest navy cruiser, Pensacola.

Whirling Tower Teaches Flying



Alvin Bisch of Chicago is shown at the right with a model of his airplane training tower designed to teach flying with absolute safety. As shown in the drawing above, airplanes will be suspended from the tower by means of cables, and the student pilots will be able to control their machines in the same manner as a free-flying airplane.

Bring Arctic to Quarters of Polar Bears in a London Zoo

ARCTIC conditions have been effected in the polar bear quarters in a London zoo. One of the "residents" is shown at left enjoying the ice-cold water supplied during the summer months.

Artificial caves have been constructed in which the temperature is kept below zero during hot weather. Whenever the bears want a little exercise they waddle out and take a plunge in the cool water. Cakes of ice are dumped into the pool at regular intervals.

Horse Wrecks Freight Train

BECAUSE a horse wandered onto the Northern Pacific railroad track near Wilbaux, Mont., the railroad company lost $200,000, officials have estimated.

Old Dobbin did his wandering at a tragic time for himself and an inconvenient time for the railroad. A westbound freight was using the track at the same time and things happened. The horse was killed, but the front wheel trucks of the engine left the track and the train turned over on its side.

There were 52 cars in the train and 22 of them left the track. Wrecking crews worked 15 hours to clear the rails. Many of the cars contained automobiles, nearly all of which were damaged beyond repair. Breakfast food, broken sewer tile and other commodities were strewn around the landscape. The engineer said that he didn't see the horse.

Chemists Create a New Sugar

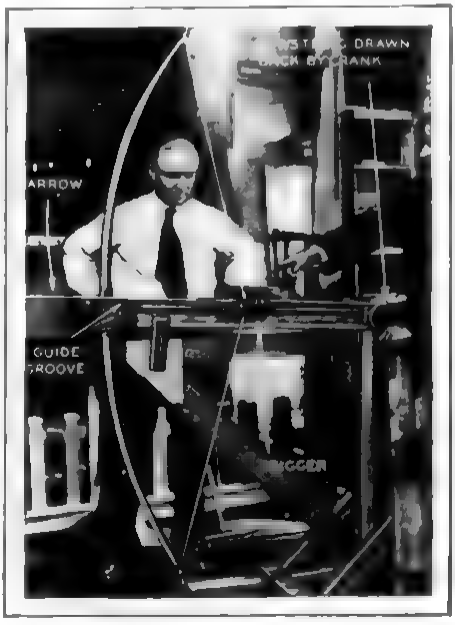
A FORM of sugar that does not occur in nature has been originated by Dr. C. S. Hudson of the U. S. Public Health Service and Miss Edna Montgomery. Results of their experiments were announced at a recent meeting of the National Academy of Sciences in Washington, D. C. The substance is analogous in structure to common table sugar. It is called lactoketose and was obtained by treatment as an alkaline medium.

Mechanical Archer Tests Arrows

TESTING the accuracy of arrows under any stated circumstances, this machine shown below at right is the innovation of the Archery club of Seattle, Washington.

An arrow is placed in the guide groove with the quill-end against the center of the bowstring. This is drawn back by means of a crank. It is possible to draw the bow until the tip of the arrow extends just slightly in front of the center.

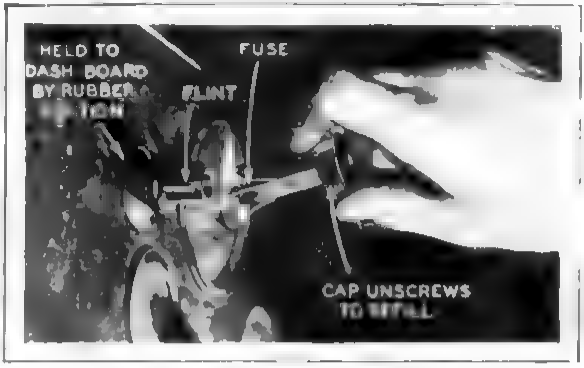
The arrow is shot out by pressing a small trigger that releases the bowstring. The angle at which the arrow is shot may be regulated by a lever underneath the groove.



Lighter Attached by Suction Cup to Dash Board of a Car

REQUIRING no detailed installation, batteries or clumsy wires, this novel cigar and cigarette lighter shown at right is easily attachable to the dash board of a car. A single pull with one hand produces a light when driving.

It is made of bakelite in a variety of lustrous duco colors. A sharp file scrapes over the flint and produces a spark. A wick extends immediately below and catches fire. The lighter is filled with gasoline.



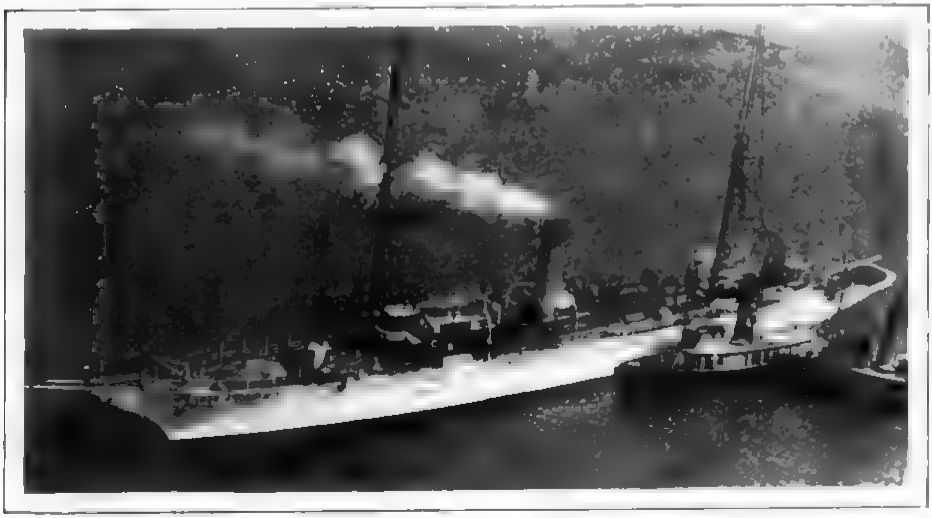
British Air Chief Urges Defense Against Attack Miles Above the Earth

MAKING an appeal for volunteers in Great Britain's air service, Air Vice-marshal F. R. Scarlett, in command of the "fighting area" of the Royal Air Force, predicted that air warfare in the future will be conducted in the upper limits of the earth's atmosphere. Battles will be so ferocious that the defensive side may be wiped out by a single attack of the enemy, he said. A larger dose of the same medicine is the only solution to the problem, he claims.

Hoover's Decision Terminates Career of Presidential Yacht, Mayflower

WHEN President Hoover recently decided to forego the use of the yacht, Mayflower, shown in the photo below, to reduce national expenses $300,000 yearly, he again changed the status of a vessel that has known nothing but change in its 33 years of existence.

Designed as a private yacht, it spent only a short time in that capacity. It was active as a dispatch boat of the "mosquito fleet" in the Spanish-American war, and serving as the presidential yacht since 1905, has been subject to the whims, habits and fancies of five different government heads.



The Mayflower, former presidential yacht, shown being towed into the Philadelphia Navy yard.

This Rope - Controlled Glider Teaches Flying in Safety

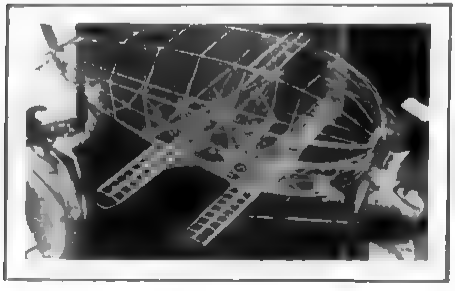
GLIDERS of the type shown in the photo at the left have been installed at a French flying school for the purpose of teaching embryo pilots how to control a plane in the air without much danger to themselves. Two ropes, pulled rapidly along the ground, impart flying speed to the glider and keep it under control at all times. Speed is regulated by the rapidity with which the ropes are towed. Controls are the same as in an ordinary airplane, tail surfaces and ailerons being manipulated by a stick. The student pilot not only gains the "feel" of the air with absolute safety, but at considerably less expense than if a large motored plane were used for training. This training type glider presents numerous points of difference from the popular Northrop glider published in the June MODERN MECHANICS. The glider in the photo is very lightly constructed, not being intended for long flights. Glider flying is recommended as teaching the co-ordination of mind and muscle necessary for controlling an airplane.

Tin Can Orchestra Popular

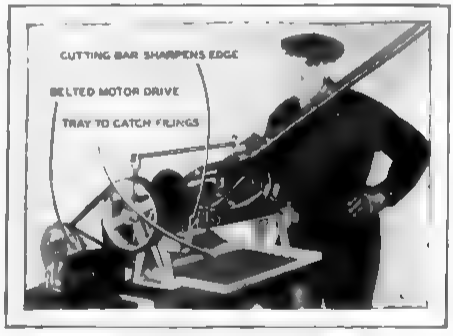
NEW YORK'S "Tin Can Symphony Orchestra," made up of 128 children playing musical compositions on instruments of their own construction, recently gave its second annual concert. Crockery, cornstalks, sea shells, walnuts, test tubes, pickle barrels, flower pots were numbered among the odd contrivances from which the youngsters managed to coax musical sounds.

Airship Has Novel Design

VERTICAL ascent and descent under its own power is promised for the new "dirigi-plane," a model of whose skeleton framework appears in the photo below. The craft is the invention of R. J. Binkley, Los Angeles inventor, and takes its name from the fact that it possesses a gas bag like the big dirigible Zeppelins, and also a set of airplane wings. When completed the ship will be 224 feet long, 96 feet wide, and will have 5 motors which will drive it at 180 miles an hour. The outer covering of the gas bag will be of metal.

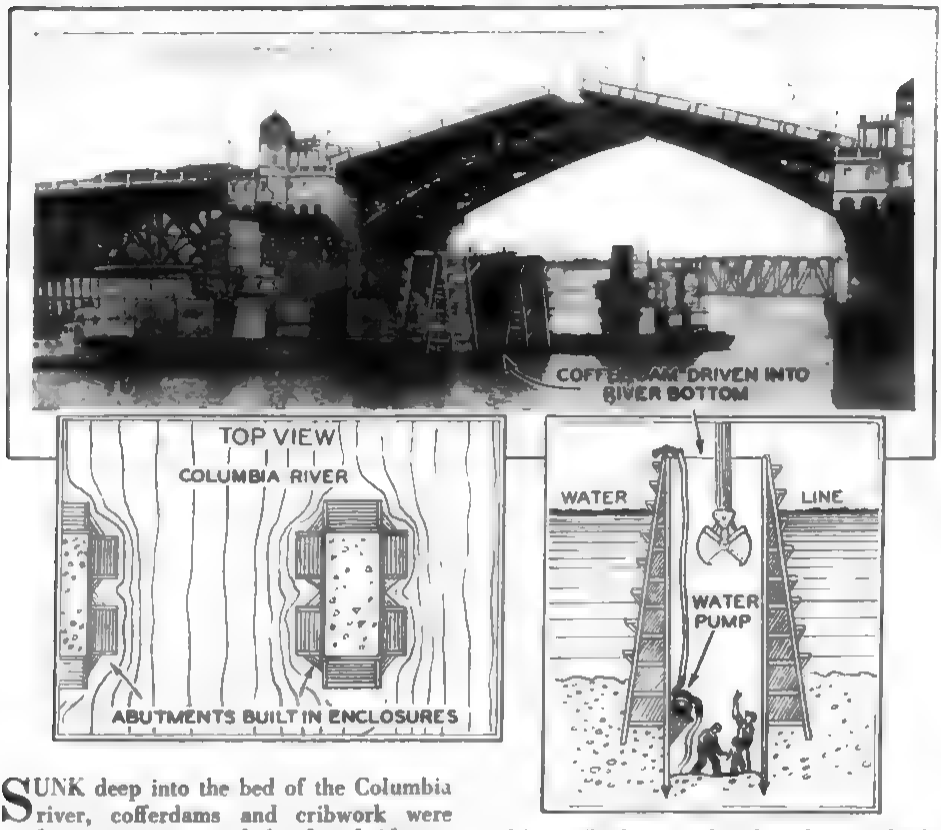


New Lawn Mower Grinder



A NEW lawn mower grinder which sharpens dull blades by reversing the action of the mower and grinding the blades against the cutting bar of the machine, has recently been placed upon the market. As shown in the photo above, the mower is placed in the sharpening device and power is supplied from a small electric motor. The blades, grinding against the cutting bar of the mower, are thus automatically filed to the same height, insuring that each knife will cut the grass cleanly. A special grinding compound is furnished by the makers of the machine.

Cofferdams Aid in Construction of Bridge Abutments



SUNK deep into the bed of the Columbia river, cofferdams and cribwork were used in construction of the first bridge to span the stream below Portland, Oregon.

Water pumps kept the enclosures dry and allowed workmen to lower themselves into the pits to prepare the forms for the cement. When it had set, the cribwork and dams were removed and the bridge spans were laid horizontally on the abutments.

The cofferdams and cribwork were built in Portland and floated down the Willamette and Columbia rivers 50 miles to the bridge site at Longview, Wash. A tug and barges conveyed the cargo on its trip. The bridge was built only after strong opposition was withdrawn when plans were changed to increase its height and pier clearance.

Thugs Get Literary Streak and Leave Notes as They Depart from "Jobs"

THE SUBSTANTIAL qualities of a safe were recently lauded in a note left in an oil station in Newark, N. J., by a yegg who was attempting to rob it.

"You've got a good safe. Worked from 2 to 5, but didn't get anything," he scrawled on an envelope. But the station owners will be watchful, for he also said, "See you some other time. Good bye and good luck."

The system of broadcasting crime news over the radio in Chicago will have to be changed if it is to help police thwart robbers "plying their trade" in the city. A thug was recently at work in a Chicago home in which the radio was turned on. When he was in the midst of his operations, the announcer suddenly broke into the program with the warning to police that the home in which the robber was working had been entered. The light-fingered one looked appreciatively at the loud speaker, gathered in his tools and departed from the house. He, too, left a note of thanks.

WONDER PLANES of

By ANDREW R. BOONE

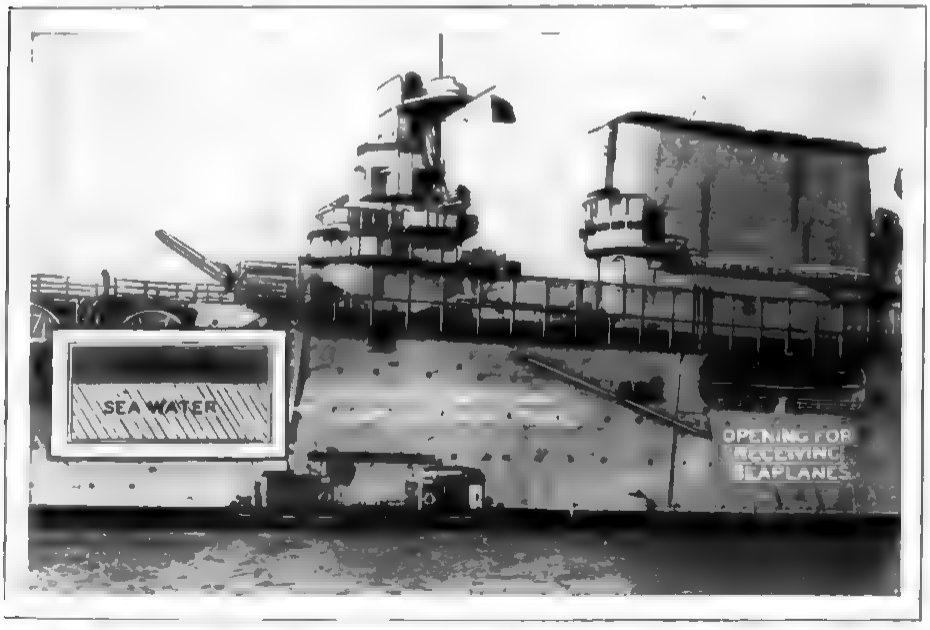
TEN years ago, if anyone had predicted that the Navy of the future would be incomplete without its quota of airplane mother ships capable of carrying land and seaplanes of various types which could take off directly from the deck of the ship in any kind of weather with a load of bombs or in pursuit of enemy craft, he probably would have been told that such developments, while not improbable, could not come to pass for at least a quarter of a century. Yet today, thanks to the ingenuity of Navy engineers, the United States has not only three magnificent airplane carrying ships in the *Langley*, *Lexington* and *Saratoga*, but has also developed a number of extraordinary new airplanes especially adapted to the double purpose of land and sea combat.

Several factors enter into the design of these types of plane. New planes are carried on the ships of the fleet and naturally must have the utmost possible performance and service ceiling, compatible with low landing speed; and their size and weight have been reduced by the use of air-cooled radial engines and the employment of light alloys and ingenious details of construction. The latest development in this class is the single seat Boeing fighter designed around a 500 horsepower engine.

Corsair Is Two-Place Plane

The *Corsair* in the two-place class has been developed around the same engine as a general purpose plane. It also has been adapted as a land plane for airplane carrier use in scouting squadrons, while from the battleships it is launched on a pontoon.

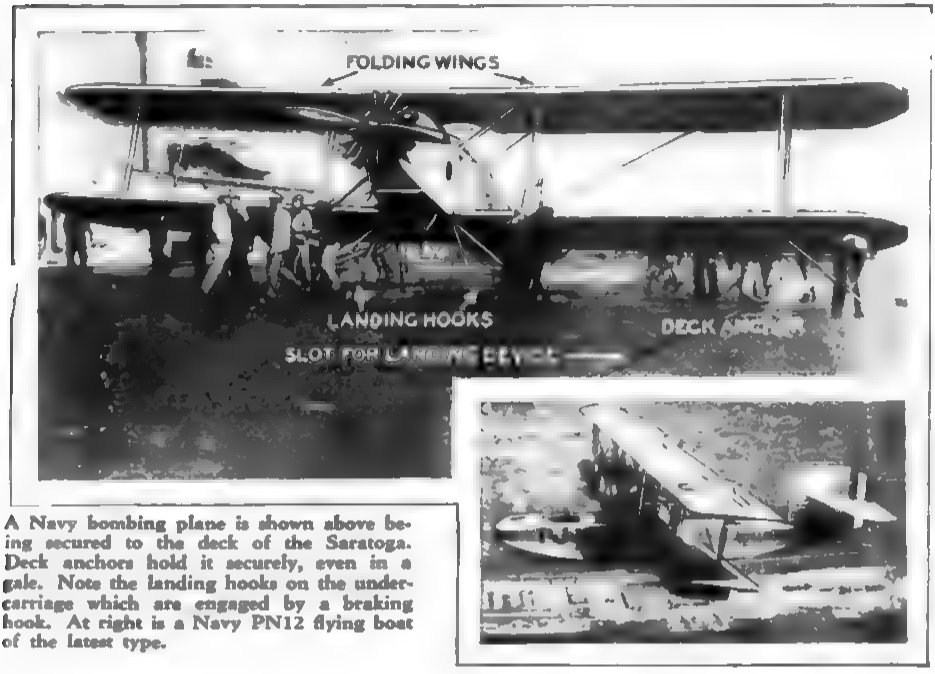
The third class of planes used by the Navy from the new carriers are torpedo-



This partial view of the airplane carrier Saratoga gives an idea of the type of craft developed by the American Navy as mother ship for its fighting planes. The superstructure is located on the port side of the ship, leaving the deck free for airplane landings as shown on the opposite page. The oil barge in the foreground is transferring 140,000 gallons of gasoline aboard. This gasoline is stored in a number of tanks. Whenever gas is withdrawn, sea water is introduced to keep the tanks always full, preventing the contents from splashing around and generating dangerous fumes.

the NAVY

Uncle Sam's newest Navy airplanes operate either from land or sea bases—flying boats, bombers, pursuit planes carry battle into the air hundreds of miles out at sea.



A Navy bombing plane is shown above being secured to the deck of the Saratoga. Deck anchors hold it securely, even in a gale. Note the landing hooks on the undercarriage which are engaged by a braking hook. At right is a Navy PN12 flying boat of the latest type.

bombing planes, which use 525 horsepower air-cooled engines. The present modern bomber is lighter by more than 2,000 pounds than its immediate predecessor and in this plane the designers have achieved flying qualities approaching those of lighter airplanes.

Even the patrol planes—the big twin-engined flying boats—now have metal hulls and wings.

The newest planes adopted by the navy for carrier use are Boeing fighters, known as F4B. For the first time, as exemplified in these planes, a United States manufacturer has streamlined an air cooled motor and produced a plane which combines high speed in the air with a relatively low landing speed. The new Boeing lands more slowly than any previous navy fighter and outperforms all others in the air.

These planes have been designed for carrier use primarily and as others are manufactured will be placed aboard the carriers *Saratoga*, *Lexington* and *Langley*. They will be used as fighters and for light bombing operations.

The Boeing is the smallest fighter yet manufactured. The plane measures 30 feet from wing tip to tip and is 20 feet, 3 inches long. These figures compare with 36 feet and 26 feet for its immediate predecessor's dimensions. In seeking this plane, it is understood the Navy made known to the manufacturers three requirements: a lighter plane, a faster plane and a smaller plane. Accordingly the weight has been diminished and no strength sacrificed. The plane proper weighs 800 pounds, the engine and other parts of the power plant 800 pounds, and it has a useful load of 800 pounds. Exclusive of fuel and lubricating oil and pilot it can carry an "offensive" load consisting of guns, ammunition and bombs of approximately 300 pounds. It has a cruising radius sufficiently long to permit any necessary operations from a land station, carrier or battleship.

To date the plane has developed a high

U. S. Navy's Fighting Planes Operate Either From Land or Sea Base

A squadron of Curtiss Hawks is shown above on the landing field at North Island, California, ready to take the air and land on an airplane carrier hundreds of miles out at sea. They are ordinary land planes equipped with regulation wheeled landing gear, and can operate either from a land base or from a carrier ship like the Saratoga. At the left a number of Marine Corps bombers are flying over the Pacific near San Diego, California.

speed at sea level of approximately 184 miles an hour. It is understood the plane will reach top speed of approximately 200 miles an hour at an altitude of 5,000 feet. This is accounted for partly by the fact that the propeller is set at a high pitch and does not reach maximum efficiency at the lower altitudes.

The plane is powered by a Pratt and Whitney Hornet motor developing (rated) 500 horsepower at 2100 revolutions a minute. When the motor is equipped with a supercharger, this horsepower at high altitudes will increase with speed to about 625.

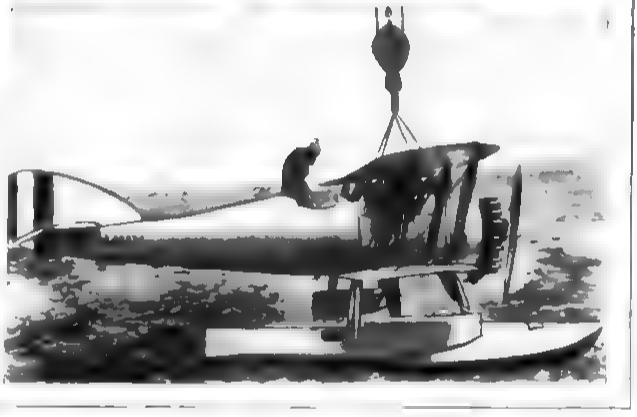
In this plane one notes two changes of particular interest. First, the fuselage and control surfaces are constructed of duralumin. The wings are constructed of wood and fabric. Control surfaces have been corrugated for greater strength. The fuselage presents a narrow appearance, and is in fact less bulky than that of the earlier fighters.

The second point to be noted is the streamlining of the motor. Where, in earlier fighters, the motor merely was "stuck out in front," here the fuselage is built "through" the motor. That is, the metal fuselage covering has been projected between the cylinders of the engine and rounded in front. From the pilot's point of view this is important, for it permits him to see between the cylinders the deck of a carrier and land with greater precision and safety.

Also, the matter of distributing the useful load, weight of plane and weight of power plant in equal parts is important. This explains in part the general high performance of the plane and its high speed in the air and low speed on landing. The low landing speed, not announced by the Navy, is accounted for by the very light weight of the plane. This is the lightest fighter in the history of naval air development.

Important from the Navy's viewpoint, this plane will increase the efficiency of the aircraft carriers. Already the *Langley*, designed to carry 12 airplanes, carried 42 on the recent cruise to Hawaii. Just what

These Folding Wing Planes Stow Into a Small Space in Ship's Hangar



Two methods of handling fighting planes at sea are illustrated in these photos. Above a deck crew is folding back the wings of a bombing plane preparatory to stowing it in a hangar below deck on the U. S. S. airplane carrier Lexington. Pontoon-equipped planes are also used by the Navy, as shown by the photo at right in which a Vought Corsair is being lifted aboard ship by means of block and tackle.

the plane will add to the capacity of the *Saratoga* and *Lexington* is a matter of conjecture.

Planes of this type are subjected to perhaps greater strains than any others. Flyers maneuver them at top speeds and the achievement of building a plane weighing only 800 pounds for such rigorous work as fighting is considered by Navy officers to be noteworthy. Manifestly many details of the plane are secret, to be guarded by the Navy. Among these the way in which it is stopped in a very short space aboard a carrier is phenomenal — but very, very secret.

Generally speaking, the tactical employment of naval airplanes, which is highly specialized, determines the types of aircraft used. These must be as few as is consistent with carrying out the aviation mission of the fleet.

"All the aircraft of these types must be of minimum size and weight," Commander E. E. Wilson, chief of staff, Aircraft Squadrons, Battle Fleet, explains, "and must have maximum performance. Under the restrictions of low landing speed and adaptability to landplane, seaplane and in some cases amphibian use.

"The development of these types has been accomplished in two basic steps: first, a reduction in power-plant weight through the development of the air-cooled engine; second, a reduction in structural weight through the use of light alloys and the ingenious design of light-weight rugged structures."

Not only do the uses to which the Navy puts its airplanes determine their bulk, but also the space available for handling them

(Continued on page 190)

Helicopters Pull Model Airplane Straight Up in the Air

The hull of this model combination plane and boat is constructed so that it will float in water.

LIFTING five times its own weight, this model flying boat is equipped with helicopters that are alleged to pull it straight up from the ground in a vertical line.

It was devised by an Australian watchmaker who has been experimenting with helicopters for the past 17 years. This type of propeller is shown in the photo extending on horizontal arms that run parallel above each wing. They are operated from the motor by control rods.

The front propeller is so designed that when the ship settles in water the whirling blades, slowed by a throttled engine, act in the same capacity as a paddle and pull the ship forward over the surface.

Seek to Safeguard Laborers

THE United States Department of Labor is seeking to secure legislation that will safeguard workers on federal projects.

Reports from the statistical bureau indicate that most of the state codes are considerably out of date along this line, especially with reference to demolition work.

Officials of the department are proposing a council of state bodies for the purpose of revising and standardizing building codes. It is believed that such a conference is becoming imperative as building contractors increase their participation in interstate business.

In a research it has been found that 24 states now have laws for the protection of employes on buildings, 19 have laws giving commissions power to make rulings on the subject and ten have both types of laws.

King Knights Major Segrave

THE man who broke the world's automobile speed record is now Sir Henry Segrave. The accolade of knighthood was conferred upon him by King George at Craigwell House, near Bogner, England.

Following the traditional ceremony, the King chatted with Sir Henry, asking him how it felt to drive the "Golden Arrow" racer at a speed of 231 miles an hour. Sir Henry then lunched with Queen Mary and drove back to London in his pleasure car.

The Englishman recently drove his $75,000 racer over the Daytona Beach course in Florida to capture the world's automobile speed mark from Ray Keech, American driver, who formerly held it at 207 m.p.h.

Stealing Iowa's Corn Laurels

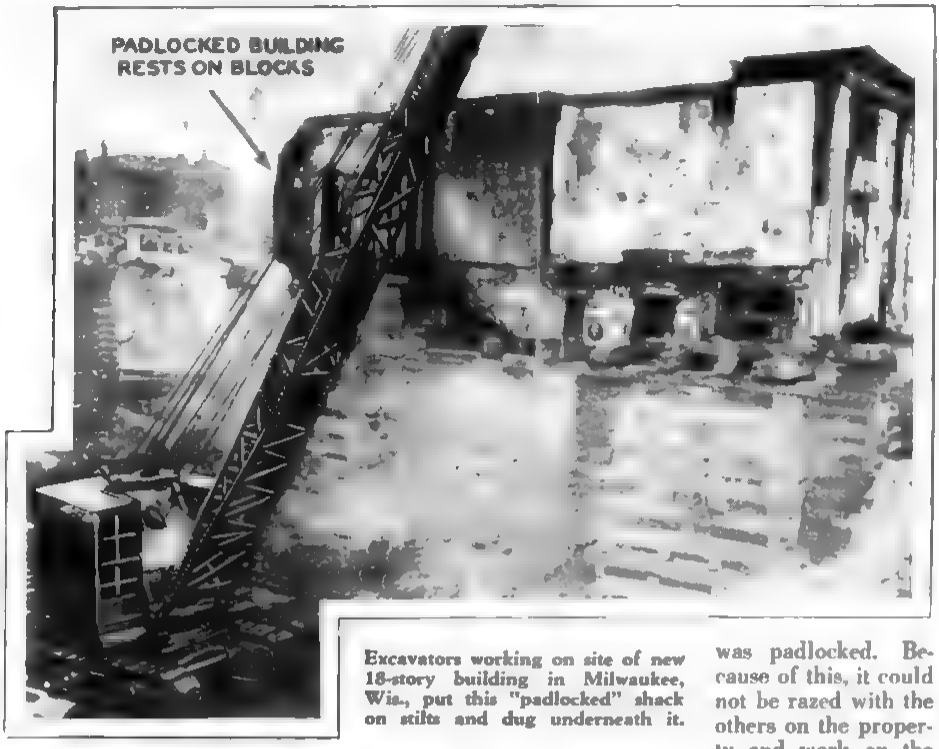
NOT all large cornstalks are grown in Iowa. This towering stalk shown below was raised in California near Los Angeles. It measures 13 feet five inches from its tip to the rugged bole extending into the ground.

Comparison of the surrounding stalk with the ten foot ladder on which the farmer is standing shows that the giant stalk is not entirely a freak.

If corn grows like this in California, there is little wonder why so many Iowa farmers tour to the coast!

Ears of this corn measured 14 inches in length.

Working Around a Government Prohibition "Padlock"



Excavators working on site of new 18-story building in Milwaukee, Wis., put this "padlocked" shack on stilts and dug underneath it.

FOR a time it appeared that a federal prohibition "padlock" would delay the erection of an 18-story office building in Milwaukee, Wis. After the Milwaukee Gas and Light company purchased the site, federal raiders found that liquor was being sold in one of the shacks. The building was padlocked. Because of this, it could not be razed with the others on the property and work on the new $1,500,000 building was held up. After consulting lawyers, the contractors evaded the ruling in the manner shown above.

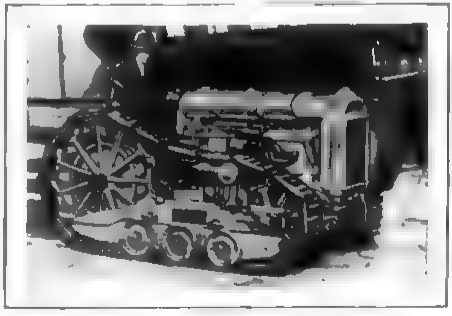
The work of excavating and laying foundations for the new structure was continued by blocking the padlocked shack up and digging beneath it.

Tractors Aid in the Work of Handling Big Airships in Many Airports

USE of tractors is by no means confined to agricultural pursuits. Many airports have adopted them to take care of a number of jobs about the field. The chief duty lies in hauling large airplanes to and from their hangars.

The tractor shown at right is used for this purpose at the Shiphol Flying field in Holland. It moves the huge Fokker transport planes about the field without the necessity of starting the motors or getting a crew of attendants to push and pull them.

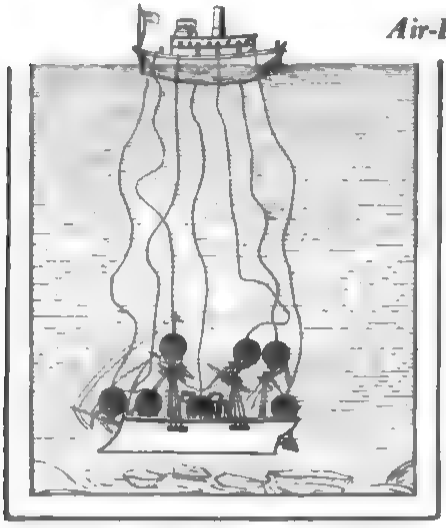
Grading and harrowing the landing field is also done with this willing servant. Also drain ditches are dug and deepened.



Tractor is used in Holland airport to move planes, harrow and grade the field, dig drainage ditches.

PATENTS—Nutty or

Believe it or not, every device illustrated on these pages has been granted a patent by the government. Nutty or Novel — which?

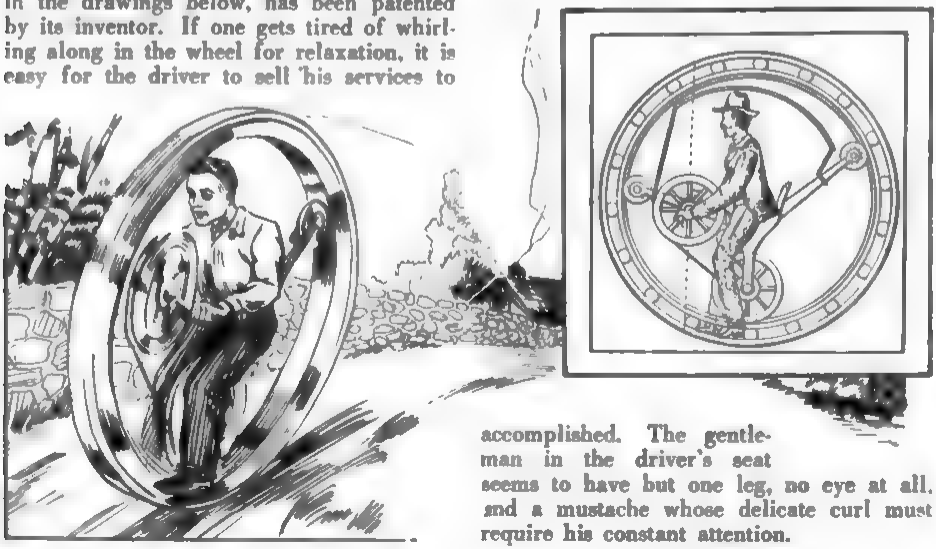


Air-Filled Balloons Salvage Sunken Ships

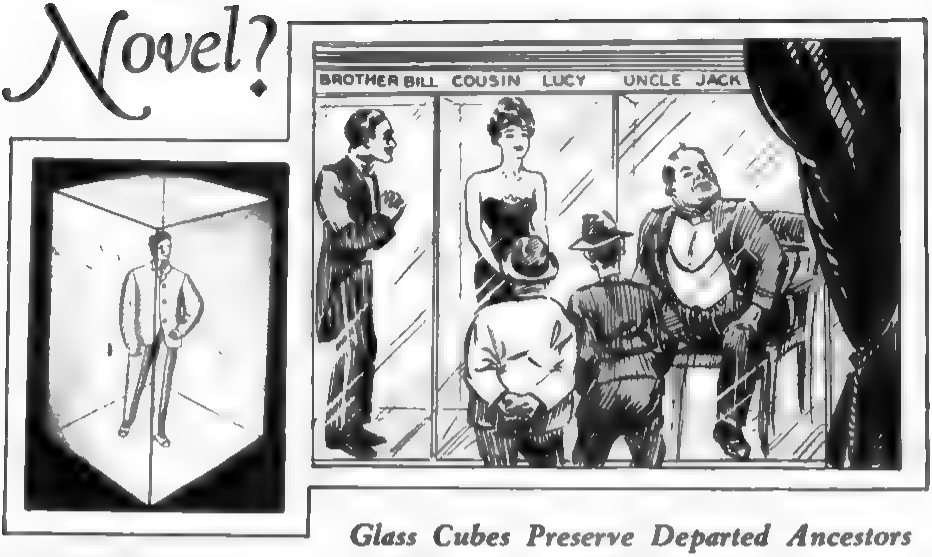
SEEKERS after sunken Spanish galleons loaded with pieces of eight will have to equip themselves with balloons in addition to horse pistols, cutlasses, and other piratical impedimenta if they are to be strictly up-to-date in the matter of ship salvaging. The drawing at the left, taken from patent office records, shows how one inventor proposes to raise sunken ships by hooking deflated balloons into the rigging. When air is blown into the balloons through the tubes the buoyancy thus gained is expected to send the wreck shooting to the surface, and there you are. All you have to do is tow the ship to port, cash in on your work, and go out again to repeat the performance. Of course, if a school of swordfish should happen along and puncture the balloons the ship would sink to the bottom again.

Novel One-Wheeled Vehicle Propelled by Hand Crank

"OVER the hill and down the dale we go, on a unicycle built for one"—or words to that effect. The new idea for individual transportation at low cost, shown in the drawings below, has been patented by its inventor. If one gets tired of whirling along in the wheel for relaxation, it is easy for the driver to sell his services to sportsmen who would like to have their tennis courts flattened out under a good roller. A study of the patent drawing, shown in the insert, shows how motion is accomplished. The gentleman in the driver's seat seems to have but one leg, no eye at all, and a mustache whose delicate curl must require his constant attention.



Novel?



Glass Cubes Preserve Departed Ancestors

CEMETERIES will be as out of date as yesterday's newspaper if the inventor of this idea for pouring glass over the dead, illustrated above, succeeds in convincing the public that a nice rectangle of cut glass is what the well dressed corpse will wear. Presumably the glass can be tinted in shades of pink, green or lavender to suit the personality of the deceased. When a sufficient number of relatives have passed on and have been properly glassed in, a very attractive gallery of ancestors can be arranged in the basement, along the front porch, or in an odd corner of the attic. Visitors can be admitted at the discretion of proprietors of the museum, and if the family is so fortunate as to own a well-known murderer in its collection, a neat sum can be collected by selling tickets of admission at a modest fee. Visiting children, however, must be carefully warned not to chip the glass by throwing stones and other missiles.

Luminous Cat Picture Frightens Timid Mice

INSTEAD of laying out money for cheese and traps, the housewife who wants to rid her home of mice can secure a life size picture of a cat which is covered with a luminous substance guaranteed to scare a mouse out of a week's growth. Once the cat pictures have been placed in strategic spots through the house, a mouse exodus which would delight the Pied Piper of Hamelin is bound to follow—little mice, big mice, and in-between mice treading on each other's heels in their eagerness to get away from there.

Skull Marker for Poison Liquor

DESIGNED especially to warn grandpa that he has grabbed the carbolic acid instead of mouth wash when he reaches for a bottle in a darkened medicine chest, the skull-shaped container pictured at the left is also an appropriate bottle for bootleggers to use in delivering their product, some of which is reported to react on the human system in much the same way as prussic acid. With its touching reminder of what you will look like if you drink its poisonous contents, the skull bottle has been granted a patent by the government as a safety aid, the idea being that you will stop, look and listen when you uncork the skeleton in your closet. The bottle can also be used to scare the children when they are misbehaving.

Destroyers Getting Hulls Scraped Alarm Harbor Visitors

WHEN visitors from the interior states noticed these two destroyers shown at left listing badly on the sands of San Diego harbor, they got all excited and thought that the fleet had run aground or was sinking.

The excitement subsided, however, when it was learned that they were placed in this position purposely. Sailors were merely giving them a cleaning, and they were expressly turned over on their sides so that the crew could get at the portion of the boats that is usually under water.

The destroyers were run as close to the harbor's edge as possible when the tide was high. As it receded they were left beached on the hard-packed sands of the harbor.

Some of the crew can be seen at the extreme left in the photo scrubbing off the grime.

Pair Off on Congo Tin Quest Lug Iron Bathtubs as a Health Measure

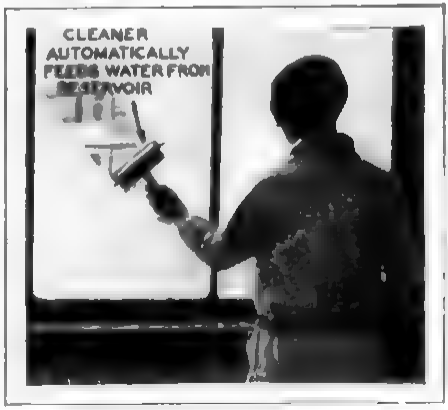
TWO YOUNG men, graduates of the University of Minnesota, recently left on an expedition to hunt for tin somewhere in the wilds of Africa. Part of their equipment will be two iron bath tubs that will be carried on the backs of natives at the rate of $2 a month. Conditions in the territory into which they are going make it impossible for them to take a bath safely in any of the streams or rivers.

Windows Are Cleaned Quickly and Thoroughly With Automatic Device

REFILLED through a detachable handle, this window cleaner shown at right contains a water reservoir that automatically provides moisture on the glass as a window is being cleaned.

The water seeps through a soft felt pad that makes up one side of the cleaner. The other side is composed of hard rubber that quickly dries the glass when pulled tightly over its surface.

The cleaner is unusually handy in that no obstructing bucket or mussy sponge is necessary. The reservoir contains an ample supply of water to wash a great number of windows. The device is also adaptable to car windshields and cleans them quickly. It can be used by service station attendants.



Auxiliary handle is attached for high windows.

Surgical Boots Help Baby Elephant Support His Weight

THIS TINY elephant at right—he is tiny for an elephant—is the baby of the Kensington Gardens Zoo in London. At the time the photo was taken he weighed close to 300 pounds and his legs were not yet strong enough to permit him to gambol about the zoo in healthy elephant style. Zoo doctors therefore took the matter into their hands and ordered a pair of surgical boots for him that help support his weight and protect his legs from becoming deformed.

The boots have steel braces along the sides and fit snugly over his legs past the knees. They are made of heavy leather that is doubled on the soles to prevent wearing out. The young elephant can now move about nimbly in his new boots.

Street Signs Will Aid Tourists

MOTORISTS need no longer crane their necks or flash on their spotlights at night attempting to discern a street's name tacked high on a lamp post. At least motorists in Portland, Oregon, will not have to, for that city has adopted a means of showing the name of a street at the bottom of the posts where a person in a car may easily see it.

Not only is it placed in a favorable position, but the name of the street is flashed on and off automatically by small electric lights in the metal case. It is clamped firmly to the sidewalk and connection is made with the lamp post. These lighted street signs will be of great value to tourists.

Glass face of street signs protected by screen.

Gas Is Used to Break Up Strike

MOBS of men and women textile mill workers in Elizabethton, Tenn., recently broke into tears at the appearance of national guardsmen whose duty it was to disperse the strikers. The general weeping was not the result of sympathy toward either themselves or the guardsmen. Tear gas bombs were used by the soldiers to break up the unruly crowd of irate workers, and approximately 100 of the worst offenders were arrested.

The gas used is harmless and only affects the eyes momentarily. It attacks the mucus membrane and inflames it so that the natural reaction is a flow of tears. While members of the mob were paying attention to their smarting eyes, soldiers equipped with masks and special glasses handled them without any resistance whatever. The bombs do not really explode. They merely give off dense clouds of the gas that quickly settles over a crowd.

The demonstration and arrests followed two hours after the water main serving the city and the mills was dynamited. The bombs were used after stones were alleged to have been thrown at buses and automobiles containing new employes of the mill.

Back of the Scenes at

Ever see the legless woman of the sideshow? This picture shows how a mirror screens the lower half of the performer's body as though cut in two.

If you have ever attended a sideshow—and who hasn't?—you have looked at astonishing exhibitions and seemingly impossible feats and have wondered, "how do they do it?" King Deckert, an old-time trouper, explains in this fascinating article how the public is bunked.

IN DARKEST Africa, the Voodoo witch doctor charges an admission and lets superstitious blacks view his weird collection of miracles; in more progressive countries, intelligent people pay their thin dimes every year to see "The Half Lady," "The Human Mermaid," "Oregon John," and scores of other "strange, strange people," who migrate from state to state during the summer months under the flamboyant banners of the sideshow. Human nature is much the same the world over—we just like to be bunked!

The Spider Girl

One of the oldest of sideshow exhibits, and one that still draws thousands of people annually, is "Spidora," or "The Spider Girl." This little lady deserves your sympathy. She has been entrapped in the mesh of a huge spider web, and her captor, apparently, has consumed her body, for nothing but her head is visible from where you view her with mouth agape.

But—it's all bunk! A mirror does the trick. This runs from the rear of the box, forward at an angle of forty-five degrees, and has its top edge hidden with a length of white tape. The girl is merely leaning forward against this glass, as shown in the drawing, with her head thrust up through the web. Of course, a roped-off area keeps the spectator at a safe distance, and from where he stands the illusion is quite complete—the mirror reflecting the bottom of the box and showing only the head of the concealed girl, apparently trapped in the meshes of the spider web.

Mirror Presents Illusion

The "Half Lady" is a popular sideshow effect which is dependent upon the principle of reflection. In this case, a special table is used, with a round segment cut out of the back to fit the waist of the prospective legless woman. The mirror is placed diagonally between the left front and right

Holding a rock on one's chest while a strong man breaks it with a sledge hammer is a striking stunt, not at all as uncomfortable as might be supposed. A brick can be broken in the hand with a hammer, without causing any pain.

the SIDESHOW by KING DECKERT

Of course you've seen this one—the girl in the web whom the spider has apparently consumed entirely except for her head. It's a favorite sideshow illusion, accomplished with the aid of a mirror.

rear legs of the table. Looking at the alcove from a fair distance, you get the impression of there being nothing whatsoever under the table—thanks to the mirror and the illusion of a legless woman is complete.

Did you ever see the "Sword Ladder?" In this effect, the performer, barefooted, ascends and descends a ladder of swords, and all this without injury to himself. Moreover, the swords are sharp—the "barker" is there to show you with the archaic method of cutting a lock of hair that these are no playthings.

How, then, does the performer do it? The answer is fairly simple. In the first place, the swords are really quite dull, the razor-like keenness being found only on the extreme tip and base of the blade. In the second place, the feet of the performer have been toughened to a remarkable degree through a continual application of alum or tannin over a period of from six months to many years. The rest is simple. You probably know that even a comparatively sharp razor will not cut you if it is pressed directly into your hand and at right angles to the skin. The sword climber operates on the same principle. By balancing his weight carefully so as to avoid any sideslip, he can ascend and descend the ladder with perfect impunity.

Breaking a Rock on One's Chest

The strong man, too, comes in for his share of bunking the public. One of his favorite effects is the famous "Rock Breaking Test," in which a huge slab of granite is broken in two with a sledge hammer while it is reposing on the chest of our hero.

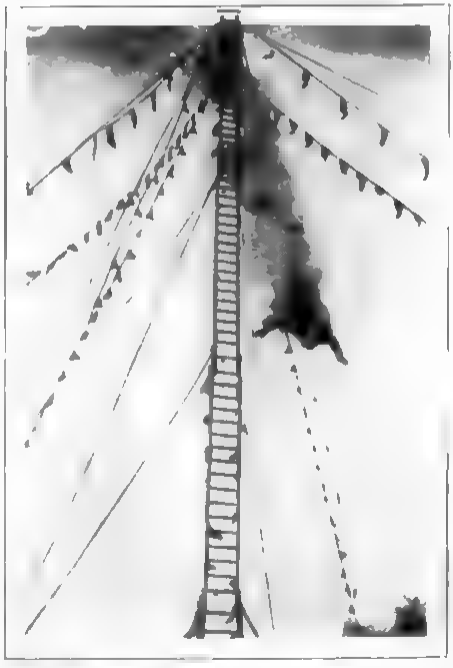
Walking barefooted on swords doesn't bother this performer. The soles of his feet are toughened with alum, the center sections of the swords on which he steps are dull, and he is careful to step straight down on the blade to avoid cutting.

There is no trickery connected with this masterpiece of deception; rather the effect depends upon a public whose knowledge of the laws of inertia is a little less than nothing. Even a brick mason could witness the demonstration and marvel, yet he performs the same effect every day when he places a brick in his hand and breaks it in twain with a few light taps of a hammer. He would deem it absurd if anyone were to ask him if the breaking of a brick in this fashion did not hurt his hand; yet he stands in open-mouthed wonder when the same effect is performed on a large scale within the glamourous confines of the sideshow tent. Actually, the strong man experiences very little discomfort—the hammer being so small in proportion to the weight of the stone that the force is distributed to all parts of the block and thereby made almost negligible.

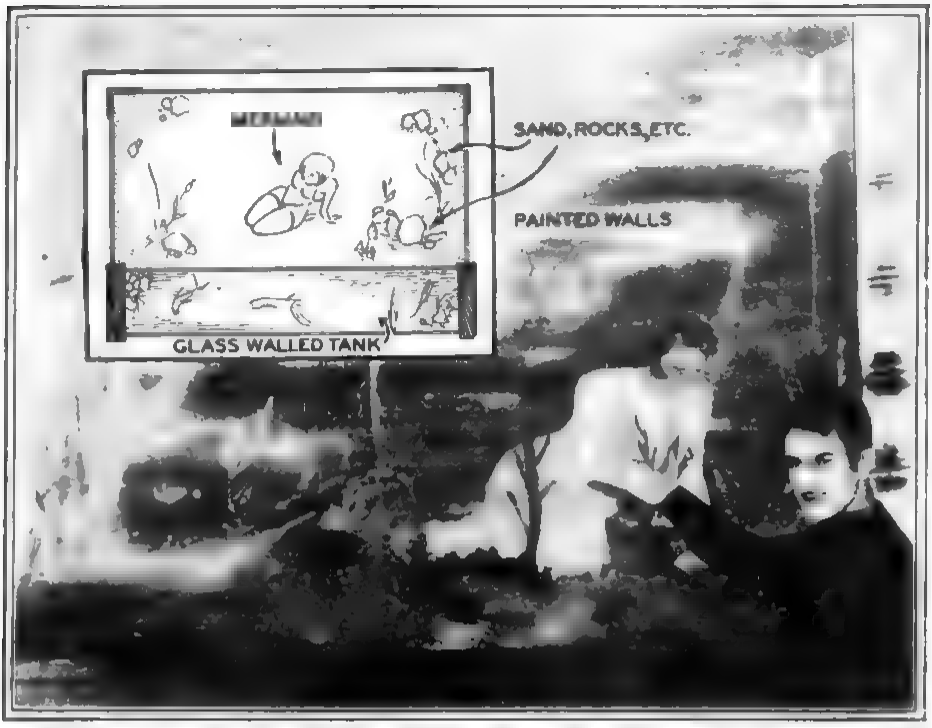
The fabled mermaids of yore had their abode in the briny deep and only poked their adorable noses out of the water at the witching hour. But . . . the mermaid you see in the sideshow . . . There she sits, day after day, entirely submerged in a glass tankful of water, with the fishes playing around her body, never coming to the surface for a whiff of fresh air. .

Underwater Mermaids

How does she do it? "Simply because," as the barker puts it, "simply because she's a real, live mermaid, and real live mermaids like that kind of stuff!" Actually, however, the "nigger in the woodpile" is something quite different. The mermaid is never in the water! She isn't even wet! All she does is take her place behind a glass tank which contains a varied collection of fish, water and seaweed. The walls of the box in which she sits is painted to resemble marine life, and from a distance the illusion of one large tank of water with a mer-



This fire-wrapped diver is not "faking" his stunt —there's no chance of that. He is, however, wrapped in an asbestos suit to shield his body.



Viewed from the front, this poor mermaid seems to be sitting submerged in a water-filled tank, playing with the sharks and swordfish, but she isn't really, at all. The glass tank containing the fishes is only a foot wide, and the mermaid sits behind it. Inset shows trick as it appears from above.

maid seated in the center of it is effected.

A popular sideshow attraction which has enjoyed considerable success during the past few years is "The Petrified Lady." This illusion can take other forms, such as "The Petrified Man," "Oregon John," etc., the effect in each case being the same—namely, that of a petrified person who still breathes, and in some cases even talks.

Pump Serves Dummy as Lung

The method commonly employed in the construction of this freak is the familiar wax dummy. This can be made very lifelike, and with the addition of a pair of mechanical lungs, operated by electric bellows from below the couch on which the dummy lies, can be made to breathe with a naturalness which is altogether human. Various other attachments are added to the figure, enabling her to froth at the mouth in a very unladylike manner, snore with great gusto, etc. With the use of advanced radio, some of these petrified figures are even made to answer simple questions which the audience may call out.

Naturally enough, everything about the sideshow cannot be bunked. That would be almost impossible. Many of the sideshow attractions are legitimate enough. The outdoor free stunts which are used to ballyhoo the show are likewise of a bona fide nature. Among the more spectacular of these is the shooting of a man from a cannon to a net 130 feet distant, the motive power being a large spring concealed in the cannon; and the "Flaming Torch" act in which a gasoline-drenched figure is set afire before diving 60 or 100 feet downward to a small tank of water.

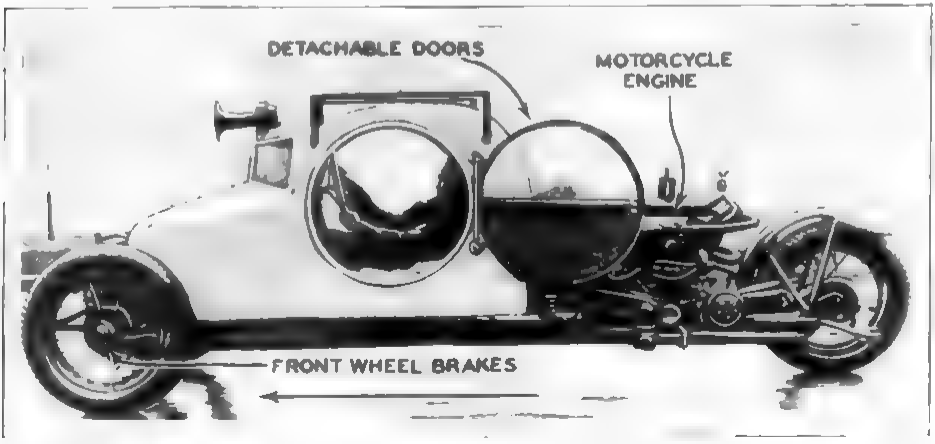
But—inside the tent you will find 75 percent pure bunk. Not that it matters. Genuine or fake, the attraction is sought by an eager public, who year after year are a living testimony to the thing which keeps the carnival and sideshow in existence—we just like to be bunked!

"Hold That Pose"—Laddie Takes a Try at Photography

"STEADY, now—there!" That's probably what this canine photographer shown above is telling Pussy as she is getting her picture taken for the family album. They are the best of friends and have long since disregarded the conventional "greeting" that usually ensues when a dog sights a cat. In fact, Laddie has championed her cause so many times it's getting to be a habit. Pussy is having difficulty in holding the pose, for a mouse is in the offing. And who cares about a picture at such a time?

English Driver Invents This Novel Three-Wheeled Pleasure Car

CONSTRUCTED on the principle of a motorcycle, this three-wheeled automobile shown below attains a speed of 70 m.p.h. It was built in Kingston, England, by A. Graham, famous race driver. The circular doors are detachable for use during warm weather. Plenty of room is afforded in the driver's compartment. The windshield is built in the body of the car. Driven from the lone rear wheel by a motorcycle engine, the car is steered from the front. A similar racing car is being planned.



Front-wheel brakes allow this car to stop remarkably short when going at full speed.

Route Unfolds Before Eyes With Novel Map-Holder

LABORIOUS folding of a road map to shield it from gusts of wind is eliminated with this new map-holder shown above. Working like a camera film, a map is loaded in the holder and turned to the desired location with a twist of the dials on the side of the case.

The frame is made of light gun metal. It is not bulky and slips easily into the side pocket of a car when not being used to make sure of the route taken.

Maps of the entire country can be purchased in rolls to fill like a film. When tourists pass through one section into another they refill with new maps.

Concrete Landing Runways of New Airport Eliminate Mud and Dust

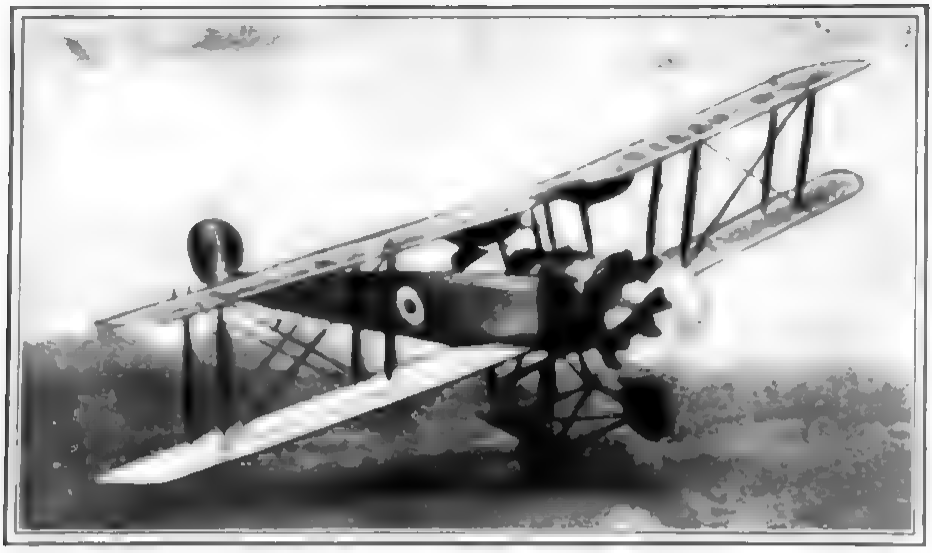
MEASURING 1,500 feet in length and 300 feet in width, concrete landing fields are a feature of the new Grand Central Air Terminal recently opened at Glendale, California, a suburb of Los Angeles.

Waterproof and dustless, they provide a firm landing and takeoff surface at cost of about 7 cents a square foot.

The site was chosen because it is only 15 minutes by automobile from the Los Angeles City Hall and is situated in a wide sheltered valley where winds are reported to blow up the expanse ninety per cent of the time. Because most takeoffs will therefore be made in the same direction, the main runway was built accordingly.

In addition to this, a concrete paved taxi strip extends along the east side of the airport, leading directly in front of the passenger terminal and widening out to a warming-up floor near the hangars beyond.

The hangars are all fireproof construction with 100-foot steel roof trusses so that there are no columns in the entire enclosed area. Various air companies have leased space for hangars on the field.



Acrobats of the Air

By PILOT GENE SHANK

There are new stunts in the flyer's textbook this year. New ships make possible outside loops, S-climbs, the new Flick roll, as well as upside down flying. Pilot Gene Shank, famous 24-year-old holder of numerous flying records, tells about tricks in this article.

HI, THERE! Gang! What would you think of me if I told you that "crazy" flying is a real science, and that it takes real stars and aerial showmen to give a smooth running exhibition of this new way of entertaining the crowds at an airfield. Crazy myself? Say, wait till I tell you!

There are some new stunts in the book that can be done now that ships are being built that will really go where you point the prop. I'll tell you about the most spectacular of these and I'll tell you why an exhibition of so-called "crazy flying" is pulled off.

The words crazy flying mean that the flyer always has his plane doing some stunt never pausing except for a brief minute's jump for altitude. Good crazy flyers with good ships decry the loss of even this minute—they say that it causes the crowds to tire. Of course, the purpose of crazy flying is to attract a crowd at an airport. The flyer comes down while the excitement is at fever pitch. The mob will ride anything then. Ergo, the pilot coins much cash in joy hopping.

The outside loop is just coming under control. A few men have tried it—Russel Williams of the Navy in a Curtiss job; Freddie Lund, the daring Waco test pilot in a taper winged, whirlwind powered Waco, and the MODERN MECHANICS Win Your Wings contest judge, Speed Holman, in a Laird Commercial. It is spectacular and difficult, and thought not safe by many. It is part of every well versed crazy flyer's ambitions. Some day it will be common.

But leading authorities say it is not so dangerous. The loop is started by a dive. The pilot then shoves the nose down under. keeps pushing her around, and comes off level. For the reason that wings which are upside down do not "bite" the air, or sustain lift well, no great loads can be im-

posed upon them. They won't assume these loads. Therefore they cannot be easily strained. The ship more or less mushes through the maneuver. For this reason engineers say the loads are not excessive.

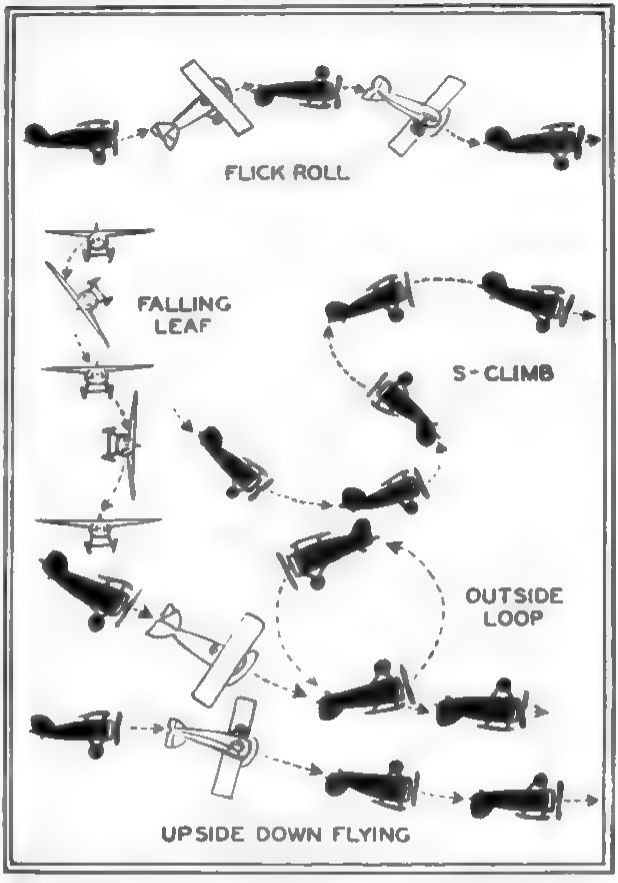
The method employed by Freddie Lund, my flying friend who is test pilot for the Waco people, differs a bit from the above, which is the method Speed Holman uses.

Freddie, using a tapered wing Waco, dives his ship to gain good speed. Then he rolls her on her back, pushes her nose around in a loop. The ship comes out of it upside down, and Freddie rolls her out level as an ironing board, and breathes a few prayers.

It is interesting to know that Freddie has to be roped into the cockpit. Double belts and normal safety precautions have to be augmented with good manila hemp.

The Flick Roll is different from the ordinary barrel roll. It is a tight spin along a normal flight path. It can only be done in highly powered ships of quick maneuverability. The pilot's technique in this maneuver is elaborate and difficult. Pulling the nose lightly above the horizon, the controls are thrown quickly into the position for a spin—aileron way over and rudder in counter coordination. Just as the ship "breaks" the correction for the spin is applied and held until the ship is level again.

There is nothing particularly new about the falling leaf as an aerobatic. It is common. But the violence of the stunt when put on with one of the hot new production jobs makes it newly spectacular. The ship can be slipped to an almost "on back" position, recovered and flipped back again. It is a graceful stunt, and the "ooohs" and "aaahs" it provokes in an exhibition of crazy flying are always good for a few added hops from joyriders at the field.



The Flick Roll, Falling Leaf, S-climb and other tricks are here graphically illustrated. The Outside Loop is started either by diving the ship and nosing her over as shown, after the manner Speed Holman employs, or by diving, rolling her upside down and pushing the nose around in an upward loop. Outsides, S-climbs and Flicks can be done only on high powered ships of quick maneuverability. Add these to "the book" and see if you have nerve enough to try them!

Upside down flying can be accomplished nowadays with greater ease than formerly. Upside down flying is really nothing but an inverse "climb to earth." Airplanes in normal flight attitude tend to climb. When put upon their backs they still tend to climb, this time towards the earth. Ships with flat gliding angles are fairly easy to hold upside down and you can "thin out the climb" downwards. Thus the effect of upside-down flying is gained. Tanks are generally

(Continued on page 192)

Floating Airports of the Sea

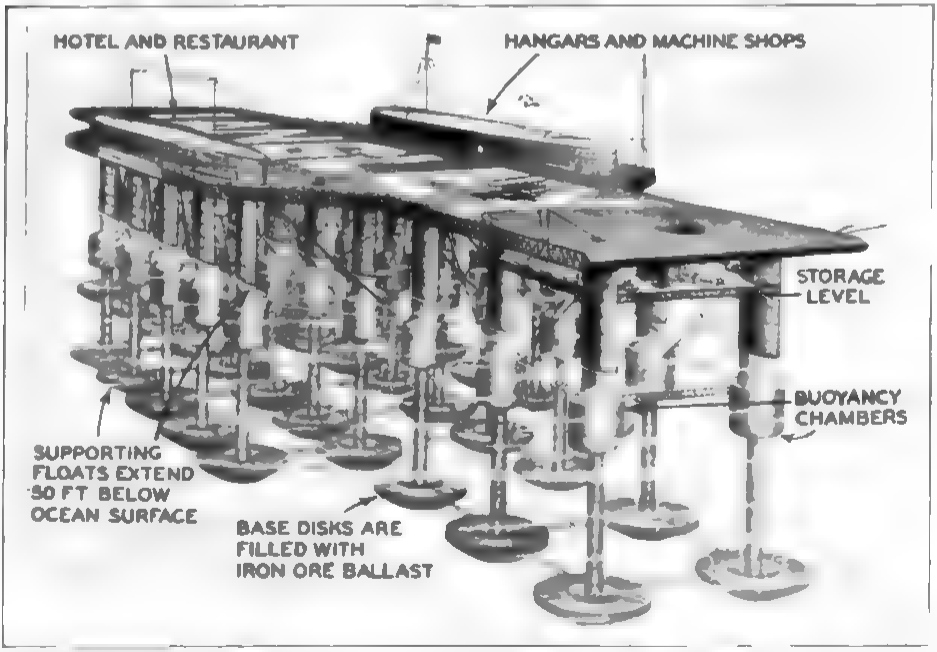
Ocean stepping-stones in the form of floating seadromes bid fair to cut down the hazards of trans-Atlantic flights.

REGULAR airplane service across the Atlantic is brought a step nearer reality by the projection of plans for a series of floating landing fields which can be anchored at intervals of a thousand miles between America and Europe, affording a safe place for passenger carrying planes to come down for refueling and mechanical attention.

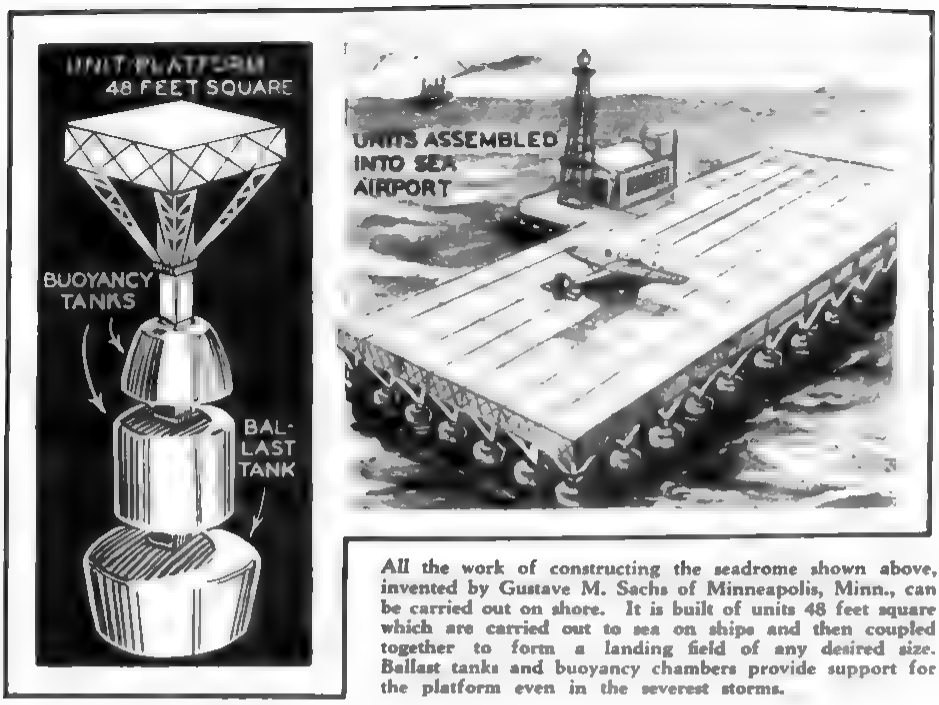
Three different types of floating airports have been designed. The one shown in the photograph below is the work of Edward H. Armstrong of Wilmington, Del. Stability of the airport, even in the roughest seas, is assured by the fact that the supporting floats extend for 50 feet beneath the ocean's surface, a depth at which the motion of the largest waves is not felt. The picture shows the method of arranging the buoyancy chambers and ballast tanks. Through a system of winches and drums for paying out and dragging in the cables, the airdrome will move with the wind so that pilots can always land into the breeze.

A steel cable weighing 128,600 pounds will be used for anchoring the drome. The cable will taper from 2½ inches where it is attached to the drome, to 1½ inches where it touches the ocean floor. Engineering details are being worked out.

A second type of seadrome, varying from Mr. Armstrong's design in that it is constructed in units on shore and assembled at sea in any desired combinations, has recently been patented by Gustave M. Sachs, of Minneapolis, Minn. A drawing of his seadrome appears on page 75. Each unit will be 48 feet square. The platform will be supported by a series of cylindrical tanks, with the largest tank at the bottom filled with ballast to maintain stability. In assembling the landing field, the units are



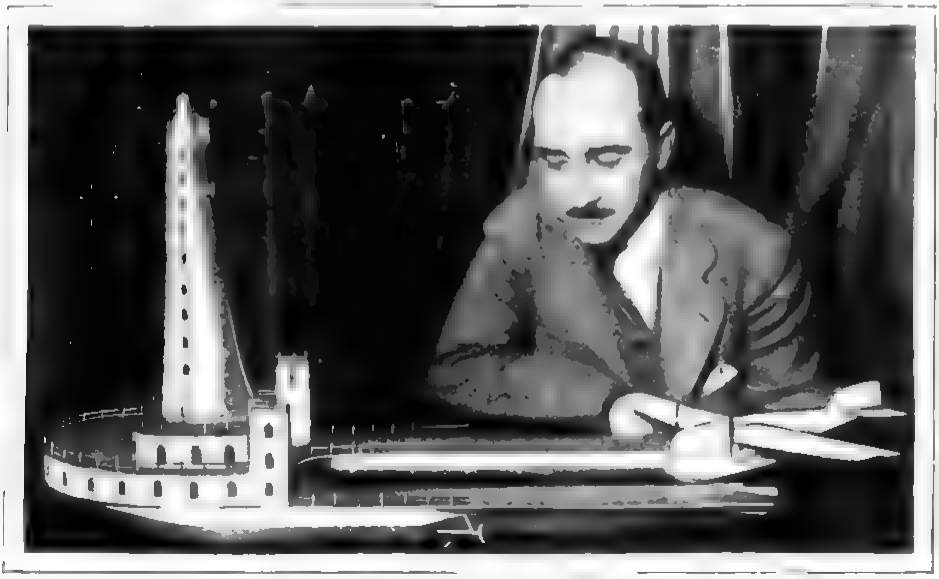
Seadromes of the type pictured above are soon to be built and anchored 400 miles apart on the ocean lane between Europe and the United States. These floating airports are expected to eliminate the dangers of non-stop sea flights by providing stopping-places for airplane refueling.



All the work of constructing the seadrome shown above, invented by Gustave M. Sachs of Minneapolis, Minn., can be carried out on shore. It is built of units 48 feet square which are carried out to sea on ships and then coupled together to form a landing field of any desired size. Ballast tanks and buoyancy chambers provide support for the platform even in the severest storms.

secured to one another by means of couplings and steel cables.

A third type of airport, pictured in the photo below, and also shown on the cover of this month's MODERN MECHANICS, is of French design. It resembles a huge floating lighthouse, as the model shows, and is equipped with propellers and driving machinery to move it about as may be required.



This floating seadrome (see front cover), is of French design, and moves about by its own power.

A SAILING CANOE for

Sail set and ready to go! Steering is accomplished by a paddle as shown above. Wear a bathing suit!

By SAM BROWN

What's better sport than sailing across a summer lake in your own canoe with a steady breeze behind you? In this article Mr. Brown gives complete details for rigging and sailing a regulation canoe.

SAILING to leeward in an open canoe, with a full spread of white canvas towering above gunwale line as a target for a spanking breeze—that is real summer sport!

Of course, you must swim. More important in canoe sailing than the rig, the canoe, or the breeze, is the ability to keep your nose above water, for no matter how expert you may be or how carefully you trim your sails, sooner or later comes the inevitable upset.

The speediest and most exclusive form of canoe sailing is done with the decked canoe, an individual type of speed-boat designed entirely for sailing purposes. It differs in construction from the ordinary canoe in that it is, with the exception of a small cockpit amidship, entirely decked. Also, it is equipped with a centerboard which extends about three feet below the bottom of the boat, and a sliding seat which extends twice the width of the canoe on either side.

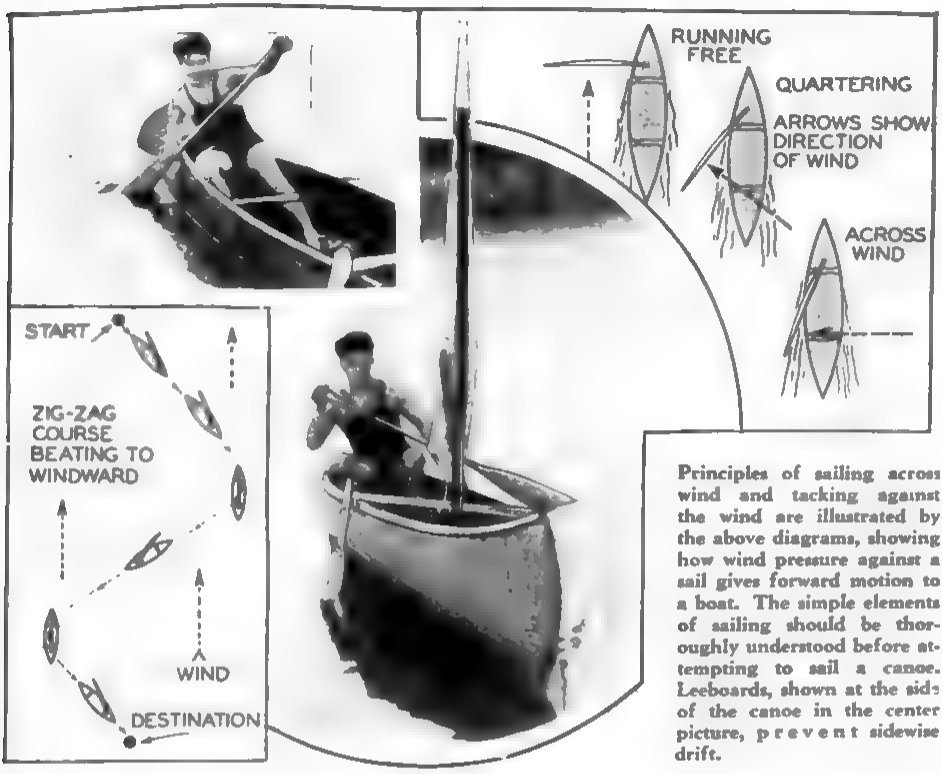
That, in short, is the decked canoe. The average canoeist, however, is the owner of an open canoe, so let us turn to the possibilities of this craft for sailing purposes. This matter of converting your open canoe into a sailing ship is quite simple—it is merely a matter of wood, bolts and cloth—and there you are!

The First Step

First of all, cut a 6-inch length of 2-by-4, and through the exact center of this bore a 1⅞-inch hole, using an expansion bit for this task, as shown in Fig. 1. Take this piece of wood, which is technically known as the "mast-step," and nail it to the bottom of the canoe in the approximate position shown in Fig. 2, taking care that you do not drive any nails completely through the boat covering.

For the mast-thwart, take a length of 3½-inch wide by ¾-inch thick lumber, and from it cut a piece to fit nicely across the top of the canoe, directly over the mast-step. Sink a 1⅞-inch hole through the center of this piece, and then nail it firmly

SUMMER SPORT *with a Lesson in Sailing*



Principles of sailing across wind and tacking against the wind are illustrated by the above diagrams, showing how wind pressure against a sail gives forward motion to a boat. The simple elements of sailing should be thoroughly understood before attempting to sail a canoe. Leeboards, shown at the sides of the canoe in the center picture, prevent sidewise drift.

in place across the canoe, directly above the mast-step, as shown in Fig. 3.

Next comes the mast. This is a 6-feet-8-inch length of round wood stock, 1¾ inches in diameter. Insert a medium-sized screw eye near one end of this pole and then slip the mast down through the hole in the mast-thwart and into the hole in the mast-step, as shown in Fig. 4.

Shaping the Leeboards

The "leeboards" are the next item. These are a simple and effective substitute for the centerboard found in larger sailing craft, and serve to prevent your craft from drifting sideways when beating to windward. The first step in their construction is to cut from ⅜-inch thick lumber, two pieces of the approximate size and shape shown in Fig. 7. These pieces should be more or less "stream-lined" by planing all edges down to a soft round edge. For the leeboard-thwart, cut from 3½-inch wide by ¾-inch thick lumber, a piece to fit across the canoe at a point 14 inches from the mast-thwart. This should be cut slightly longer than the exact width of the canoe, say a clearance of ½-inch on either side. To one side of this piece, screw on four 4-inch angles, two on each end. Notice how, in Fig. 5, these angles have been bent so that they will clamp firmly around the edge of the canoe and hold the crosspiece in place. Now, take two 6-inch angles, and, after cutting one side off at the second screw hole, bore a ⅜-inch hole through the center of the short leg. Fasten these two angles in place between the others, allowing them to project a trifle beyond the end of the board, as shown in Fig. 6. Slip the crosspiece into position, as shown in Fig. 8, and with bolts, washers and wing-nuts, fasten

These step-by-step photos show clearly the necessary accessories which must be attached to the canoe to adapt it for sailing purposes. In mounting the mast step, care should be taken not to drive nails through bottom.

are $\frac{3}{8}$-inch holes. C for the mainsheet line, D for the halyard line.

Zephyr cloth, light canvas or unbleached muslin should be used for the sail covering. The sail shown in these photographs was made from 5 yards of 63-inch wide unbleached muslin. The usual lashed rigging is dispensed with, and, instead, the spars run down two heavily-sewn seams along the edge of the sail, as shown in the drawing on page 80. Each corner of the sail should be reinforced with a small triangular piece of the same material. A heavy piece of tape should be inserted along the open side of the sail in order to safeguard against a "flapping leech."

the leeboards to each end of this cross-piece, as shown in Fig. 7.

The final step has to do with the rigging. Various types of rigging are possible, but the most suitable for the beginner is the single-lateen sail. This is a triangular sail, attached to two spars which are hinged together at their apex at a point forward of the mast, and its chief advantage is that it offers a considerable sail area without the use of a top-heavy mast.

But, to be more specific: Any lumber company handles a stock cut which they call "half-round." Get two pieces of this, $1\frac{3}{4}$ inches wide by 9 feet long, and hinge them together with a strap hinge, as shown in A of the drawing on page 81. Now, separate the ends of these two pieces to a distance of 9 feet, and lash them together temporarily at that distance with a piece of heavy cord. The drawing shows the spars held in position and also indicates two or three little things which must be done next. B shows how a piece of angled steel, called the "boom-jaw," holds the lower spar in position, a slight notch being cut in this spar where it crosses the mast. C and D

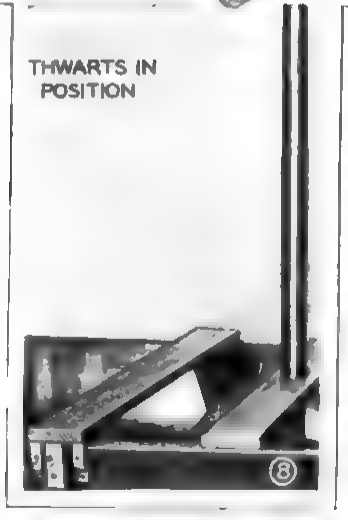
The mast step and mast thwart together form a secure mounting for the mast when the installation is completed as shown in the above photographs.

The completed sail is slipped over the spars as shown on page 80, and then fastened smoothly in place with one or two small tacks in each spar. The final step in the rigging of the canoe calls for about 30 feet of ¼-inch rope, one-half of this being attached to the end of the lower spar, while the remainder is tied through the hole in the upper spar, and from there goes through the mast screw-eye and down to the mast-thwart, as illustrated. The rope which lowers and raises the sail is called the "halyard line"; the rope which controls the boom is known as the "mainsheet."

And now to sail! If you have never sailed a boat, you should, first of all, become familiar with some of the elementary theories of sailing. There are two or three cardinal rules to bear in mind. One of the first is: When something goes wrong, head into the wind. Sailors call this "luffing." When you luff, you cease to make progress, the sail flaps idle (being parallel with the air current) and in most cases you are safe from the usual factors leading to an upset. Another rule is always to keep the mainsheet line close at hand so that in case of a sudden puff of wind you can let out the sail instantly. Inability to release the mainsheet at the proper time is one of the "main" reasons for canoe upsets!

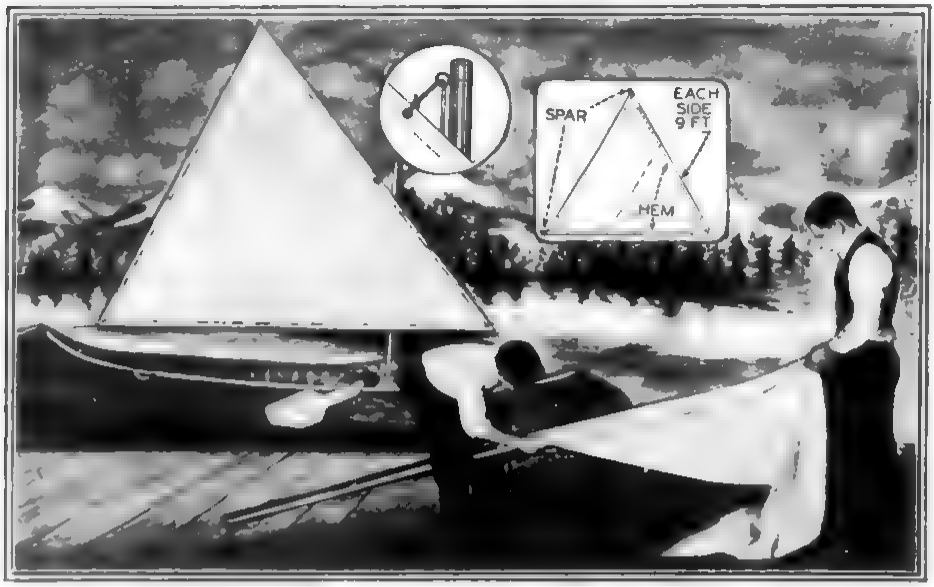
In regard to sailing itself, the simplest and most natural maneuver is sailing to leeward, that is, sailing in the direction the wind is blowing. The fullest measure of sailing to leeward comes in sailing with the wind directly behind you. When you are "running free" in this manner, watch out for "jibbing." This is caused by sudden puffs of wind which swing the boom from one side of the canoe to the other, invariably resulting in a turn-turtle episode. Other tangents in sailing to leeward are known as "quartering" and "across wind," as diagrammed in Fig. 14.

Angle irons bent to fit the rail edge of the canoe form a secure mounting for the leeboard thwart. Once the mast is mounted and the leeboards in position, as shown on these two pages, all that remains is to rig the sail and you're ready.



The leeboards, mounted to the thwart as shown in figure 7 above, take the place of the centerboard in larger ships in preventing side drift.

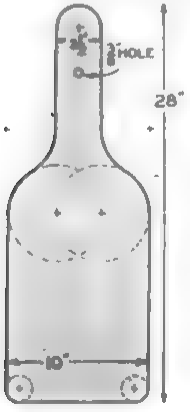
Skill in Tacking Into Wind Is Good Test of One's Sailing Ability



The two canoe sailing enthusiasts in the picture are demonstrating the method of slipping the sail over the spars. One or two tacks hold the sail firmly to the spar. Details of the sail rigging are shown in the inserts.

SAILING *against* the wind is nautically defined as "beating to windward." and it is here that real sailing skill is necessary. A toy boat can drift from one side of the lake to the other with the wind behind it. but getting back to the starting point with the wind still in the same direction is a different matter.

It is quite evident that you cannot sail directly into the wind—that would be in defiance of all laws of nature—but you can sail at an angle to the breeze and still be going forward. What you do, then, is to make your way forward by a series of zig-zag runs, these runs known as "tacks."

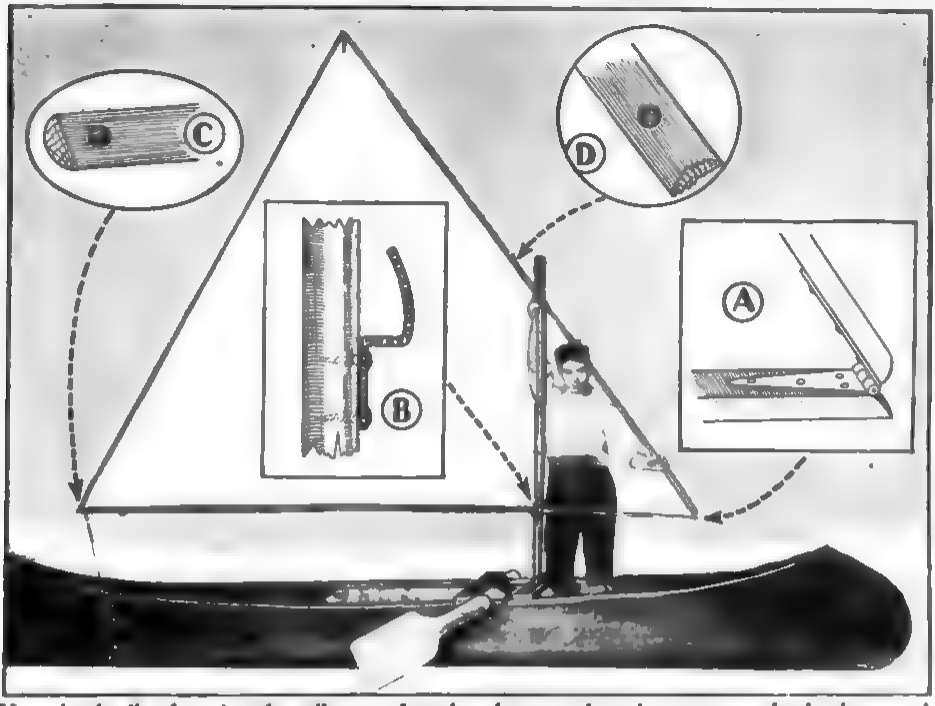


After beating along one tack on your zig-zag course into the wind, you come to the place where you wish to turn about and start off in the opposite direction. To do so, you steer directly into the wind, allowing the sail to flap idle. The boom will then swing to the other side of the craft, the sail fills again, and you are off on another tack. The diagram on page 81 should make this clear. An extra-long single blade paddle is a useful adjunct to steering when used after the manner shown in the photo on the same page.

Tacking is the whole science of canoe sailing. Given a boat and a sail, almost anyone can run to leeward, but it takes real skill, practice and much natural aptitude to make a boat behave properly when beating to windward. When you drive into the wind, the sail begins to quiver; when you nose too little, you cease to make progress. And that's half the fun. You get a real "kick" in learning, from experience, at just what angle to keep the sail in order to make good headway.

In running before the wind, with the sail extending at right angles to the length of the canoe, "wung out" as the nautical term has it, the boat has a tendency to swing with the wind, being pulled around by the breeze. The sailor must be quick with the rudder, or the steering paddle in the case of a sailing canoe, to keep his craft headed

There's Nothing Complicated in This Mounting of Sail Spars to Mast



Here the details of getting the sail spars shaped and mounted to the mast are clearly shown. A shows how spars are hinged; B is a detail showing how a piece of angle steel called a "boom jaw" holds the lower spar in position; C and D illustrate the positioning of 3/8-inch holes, C for the mainsheet line and D for the halyard line.

about so that it will not wallow in the trough of the waves. A swamped ship and an unexpected swim to shore is likely to be the reward of the canoe sailor who doesn't react instantly to the vagaries of his craft.

If the leeboards are raised up from the water in running before the wind the canoe will be found to be much faster—but the corollary of this is that it will also be more dangerous. Under no circumstances should the sheet (the line by which the sail is maneuvered) be twisted around a nail or secured in any way; the free end must always be in the sailor's hand ready for instant release in an emergency. The canoe sailor must always be ready to loosen sail quickly in any emergency.

A "spotty" breeze in which sudden gusts are mixed with periods of calm is particularly tricky. When the sail is hanging idly in a calm and the canoe is practically stationary on the water, an unexpected puff of wind filling out the sail suddenly is likely to heel the boat over. On the other hand, if the canoe is moving forward at a fair rate of speed a gust of the same intensity would not tip the boat to nearly the same degree, for the headway of the canoe serves to give it stability. The moral is: watch out for sudden puffs when the canoe isn't moving!

The lateen sail, with which the canoe shown in this article is rigged, is easily the most handy sail to handle on such a small boat as a sailing canoe. It has a low center of effort.

Here a note or two on the care of the sail might not be amiss. Sails used on boats are apt to mildew if they have been wet or damp and are allowed to lie in the sun. The cloth is not porous and the sunlight will cause what water leaks into the furled sail to steam, thus causing mildew since the furled sail is without ventilation. Care should be taken with the item of sail care as well as with all other points concerning the boat.

Odd-Shaped Reflector of Telescope Lamp Lights Shadows

DESIGNED for use with wide field microscopes, this newly manufactured lamp shown at left brightly illuminates opaque objects, eliminating all shadows.

Even though the specimen being examined may be deep with irregularities and fissures, the lamp throws a strong light into every corner and recess of the object. This is made possible by means of the reflector, the surfaces of which are shaped in ellipses.

The image seen through a wide field microscope is neither inverted nor reversed, and the long working distance from the object being observed makes it especially adaptable to dissecting work.

By rotating the drum just above the lower lens, three sets of paired objectives of different magnification can be swung instantly into approximate focus.

The high eye point enables the wearer of glasses to use it very satisfactorily.

Talk Two Hours Over Phone From Train Speeding Along at 60 M.P.H.

FEASIBILITY of a two-way telephone conversation between a person on a moving train and someone at a stationary point has been demonstrated on the Canadian National railway. A two-hour conversation was maintained recently between a train speeding northward through Ontario at 60 miles an hour and the main offices of the road at Toronto. The telegraph wires along the route were used by the system. Radio waves carried the voice of the speaker in the railway car to the wires, by which the impulses were transmitted to the receiving point. The system is operative up to a distance of 150 miles when the telegraph wires are not more than 200 feet from the tracks. A single wire will be stretched through tunnels and other places where telegraph wires are not available. Service is to be inaugurated shortly between Chicago and Toronto.

Shoe Repair Shops Supply New Sanitary Footrests for Their Customers

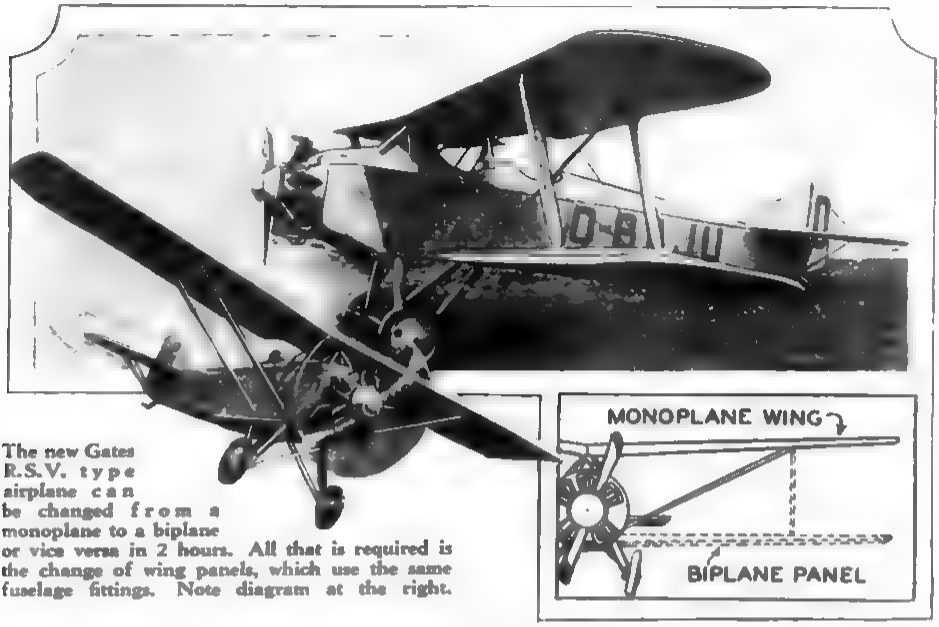
TOES need never again curl under in embarrassment while one's one pair of shoes is being rejuvenated and reinforced for another year's service. The newly invented footrest shown at the right covers the feet and shields them from the gaze of passers-by while waiting for new heels and soles.

A roll of paper in a compartment below the feet supplies each customer with a fresh section, which is stripped off in the manner of a roller paper towel after having been once used.

These sanitary footrests, designed to satisfy the most fastidious of customers, are being installed by up-to-date shops with insufficient space for the regulation booths demanded by a discriminating trade.

Women appreciate cleanliness of this footrest.

Monoplane to Biplane in 2 Hours



The new Gates R.S.V. type airplane can be changed from a monoplane to a biplane or vice versa in 2 hours. All that is required is the change of wing panels, which use the same fuselage fittings. Note diagram at the right.

THE new Gates R.S.V. type airplane, so called after its Belgian designer, R. S. Vertongen, is designed so that the stability of the biplane type can be had at will, or the speed of the monoplane can be had with mere substitution of the wing panels.

The same fuselage fittings are used for either wing system, and no changes in the fuselage are made for the conversion. To change from a biplane to a monoplane, thus enjoying the higher cruising speed of the monoplane, all that is necessary is to drop the center section pin bolts and replace the biplane panel with the single surface wing. Conversely, the monoplane wing may be dropped and the biplane panel installed, for stable student instruction.

The wing changing operation, including the process of fairing up, can be accomplished in two hours. Thus with one ship, an operator may have a splendid training biplane, or a fast all-purpose sports monoplane at no additional cost. Manufacturing economies are effected in production with this dual design, thereby enabling the builder to reach a larger buying public with no changes in model.

Duralumin and steel are used throughout. Split type undercarriage is used to prevent nosing over in tall grass. Engine noise is muffled to a point of inaudibility by the carrying of all gases aft to a point under the fuselage and to the rear of the pilot.

The plane is said to be spin proof, stall proof, and fool proof. It flies safely in rough weather.

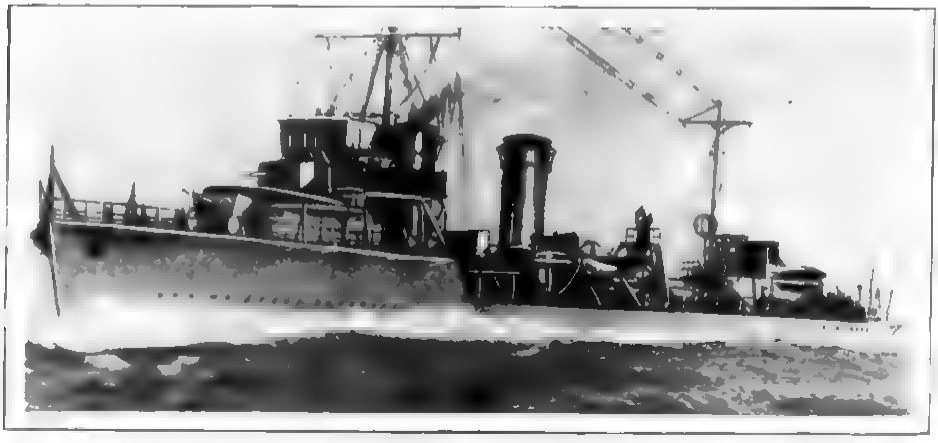
With full load, the ship will take off as a biplane with a run of not more than 200 feet. It will land in 330 feet. The monoplane performance, while requiring greater run and landing area, is in proportion. The ship is a fast climber either as a biplane or as a monoplane, it is reported.

The specifications of this ship, on which the United States manufacturing rights have been secured by an American company, are as follows: Length 23 feet; span 28 feet (biplane), 34 feet (monoplane); height 8 feet 10 inches; empty weight 925 lbs., loaded weight 1600 lbs.; cruising speed 112 m.p.h., and landing speed 43 m.p.h.

Tests with the 5-cylinder Belgian built Renard motor have demonstrated that it can run 125 hours continuously on full throttle at 1200 r.p.m. without fatigue.

New SPLASHES from the OCEAN

FLASHES of maritime activities bring news of the initial American trip of the huge German motorship, shown in top photo. Christened the *St. Louis*, it weighs approximately 16,000 tons and has two stacks. It is equipped with twin screw propellers. The crew of the U.S.S. *Arkansas* is shown in the center picture in group formation while the ship was passing through the Panama Canal. The Argentine destroyer, *Mendza*, shown below, recently set a new world's record for ships of her class by doing 40 knots an hour, which is approximately 45 miles an hour.



Junior High School Students Build This Model Dirigible

FLYING on a swivel under its own power, this model dirigible shown above was made by members of a class in aeronautics in Hamilton Junior high school, Long Beach, California.

A vacuum cleaner fan and motor were attached to the model and propel it about in a circle at a rapid rate of speed. It was made of wood and metal at a cost of $750 to the school.

The model demonstrates the newly discovered principle of aircraft propulsion invented by F. Slade Dale. The rapidly revolving blades of a centrifugal fan whirl the air away from the bow center. This causes a partial lowering of air pressure at the bow and the atmospheric pressure on the rear portions of the ship drive it forward.

The miniature dirigible was built under the supervision of John Hodgson, former engineer and aviator, now an instructor.

Coming Generation Is Growing Naturally Into the Idea of Flying

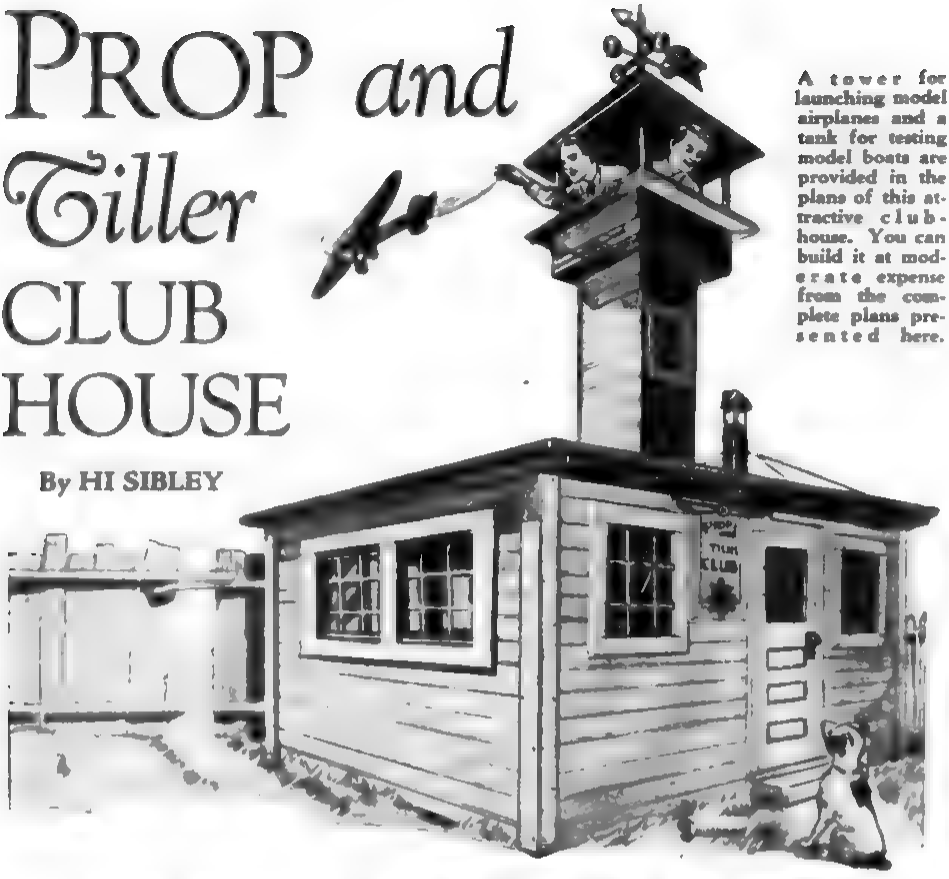
WASH tubs, wheel barrows, newspapers—in fact anything young children can lay their hands on—are being converted into transport planes, fighters and gliders of the queerest shapes and designs. Youngsters have accepted aviation as a permanent fixture and are preparing for it in their own way. Instead of playing policeman, cowboy or house, both boys and girls are pretending they are pilots, guiding a ship through the sky.

Youngster has equipped his "plane" with a single-tubed radio.

PROP and Tiller CLUB HOUSE

By HI SIBLEY

A tower for launching model airplanes and a tank for testing model boats are provided in the plans of this attractive clubhouse. You can build it at moderate expense from the complete plans presented here.



Doesn't this clubhouse strike you as being just about ideal as a meeting place for the "gang"? It isn't hard to build, either. Mr. Sibley's detailed plans show you how to go about constructing one.

HAVING selected the site for this novel clubhouse, preferably in a more or less open space in backyard or vacant lot, stake off the floor plan and locate the tower foundation.

Dig a pit about 5 ft. square and 18 in. deep and raise the four upright timbers, 4 by 4 in. by 17 ft. 6 in., one at a time by means of poles and ropes. When the first is up, guy it with four wires and by means of a plumbline see that it is absolutely vertical. When the second is up, secure this to the first temporarily by means of boards nailed diagonally, and so on with the other two.

Now mix concrete in a shallow box, using about four or five parts of sand and gravel to one of cement, and enough water to make it mushy. Here is an opportunity to get rid of a lot of junk, scraps of iron, wire, rocks and broken concrete. Throw them in the pit as you pour the concrete. This will make a heavy, solid foundation for the tower.

At the four corners of the floor plan also dig holes about 15 in. square and deep, filling these with concrete and setting anchor bolts in them for the mud-sills of the clubhouse. Be sure that these bolts are properly located and evenly spaced. The concrete will set hard enough in 24 hours to continue the work of erecting the clubhouse frame work, installing braces in the tower, etc.

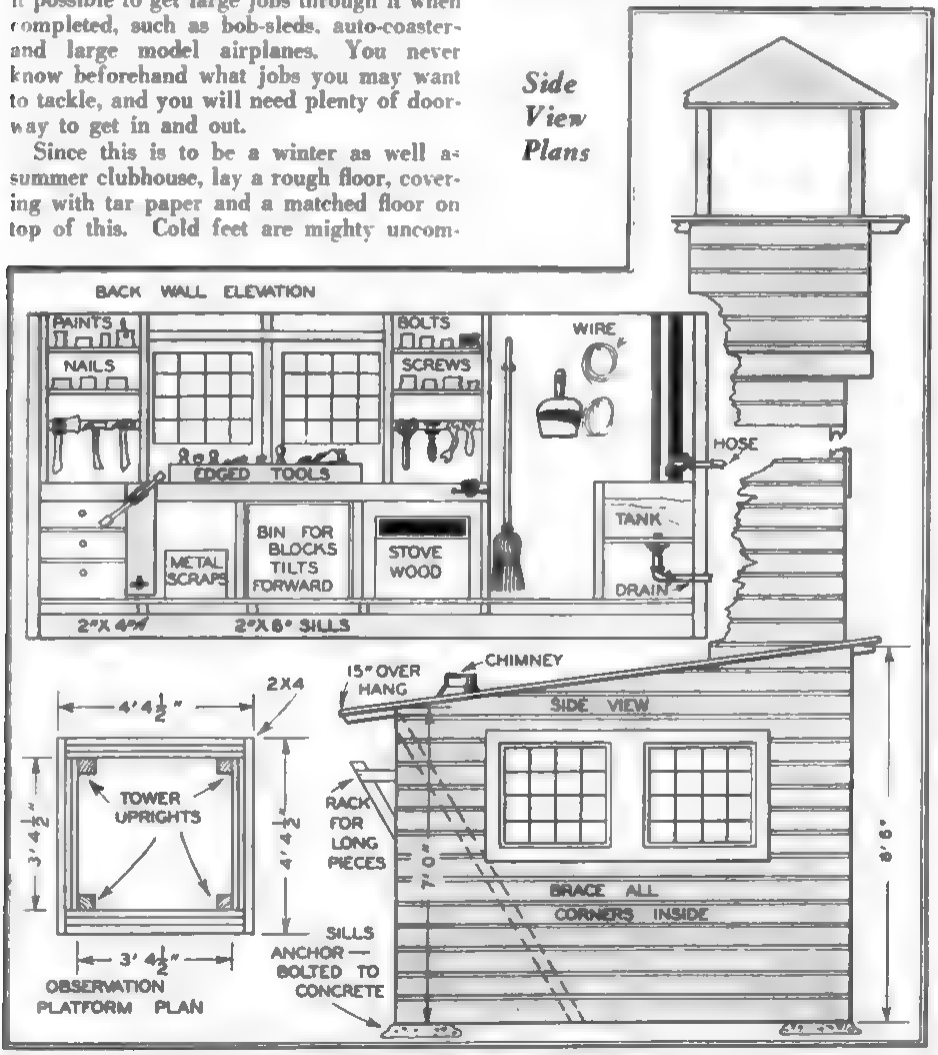
Tar Paper and Matched Flooring Make Neat, Weatherproof Clubhouse

Two-by-four studding is used in all walls, set 30 in. centers, or the conventional 16 in. centers, if you wish to invest in the extra lumber. However, the plan is laid out for 30 in. centers, which provides for the spacing of windows, tower timbers, etc., according to the drawings. Two of the rafters go just inside the tower uprights, further bracing the latter.

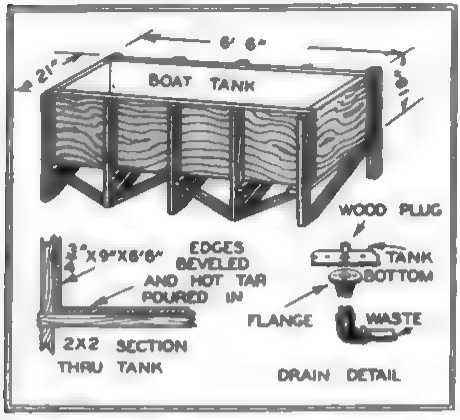
Allow for window and door openings. Install a door at least 32 in. wide to make it possible to get large jobs through it when completed, such as bob-sleds, auto-coaster and large model airplanes. You never know beforehand what jobs you may want to tackle, and you will need plenty of doorway to get in and out.

Since this is to be a winter as well as summer clubhouse, lay a rough floor, covering with tar paper and a matched floor on top of this. Cold feet are mighty uncomfortable when you want to concentrate on your work.

Any type of siding can be used, though a finished ¾ in. matched job will look well, keep tight and take paint nicely. Ample ventilation is afforded by the three sets of casement windows, and with the tower trap door open in hot weather, a cool breeze will be circulating always. Lay rough ⅞ in. lumber on the roof and cover with roofing paper. The eaves overhang



This plan shows the side elevation of the clubhouse and shows how the wall is arranged for the workshop tools. Everything in its place and a place for everything!



This detail illustrates the construction of the boat tank. Tar in the board cracks makes the tank water tight. It can float several model boats.

six inches on all sides except the rear, where it extends 15 in. to protect the long pieces of stock on a rack just beneath.

Access to the tower is by means of a ladder inside, so there is no exposure in stormy weather. Two sides of the observation platform could be glassed in for further protection. A trap door is a necessity to prevent drafts when not wanted and also as a safety measure. Weather bureau equipment consists of a thermometer, barometer, anemometer and vane. The two former can be purchased with little outlay from a hardware store; the vane is easily made as shown and the anemometer, to measure wind velocity, consists simply of four muffin tins secured to wooden arms and turning on a steel shaft. A short section of brass tubing serves as a bearing in this and the vane, and prevents wobbling.

Building the Shop

A very complete craft shop can be accommodated in the clubhouse. Wood vise and metal vise are part of the workbench equipment, with shelves against the wall on either side of the windows for paints, nails, bolts, screws, etc. If possible, have the rear of the house face south in order to get plenty of sunlight.

Shelves are built under the bench at one end for finished and partly finished work; a packing box or keg takes care of metal scraps or any material not suitable for burning, and useful wood blocks are kept in a tilting bin, much as modern kitchen flour bins are made. A box with top end sawed off at an angle receives the shavings, blocks, etc., for the air-tight stove in the corner. The latter is purposely placed near the boat tank so there will be plenty of water handy in an emergency. The stove is further protected by a sheet iron guard around three sides.

Make a low saw table of heavy planks, and build shelves in the northeast corner, beside the tower, for books on aviation, ship-building and other craftsmanship. They are valuable reference books.

If you are fortunate enough to own a lathe or other power machinery, this can be set up on a sturdy bench between the door and tower.

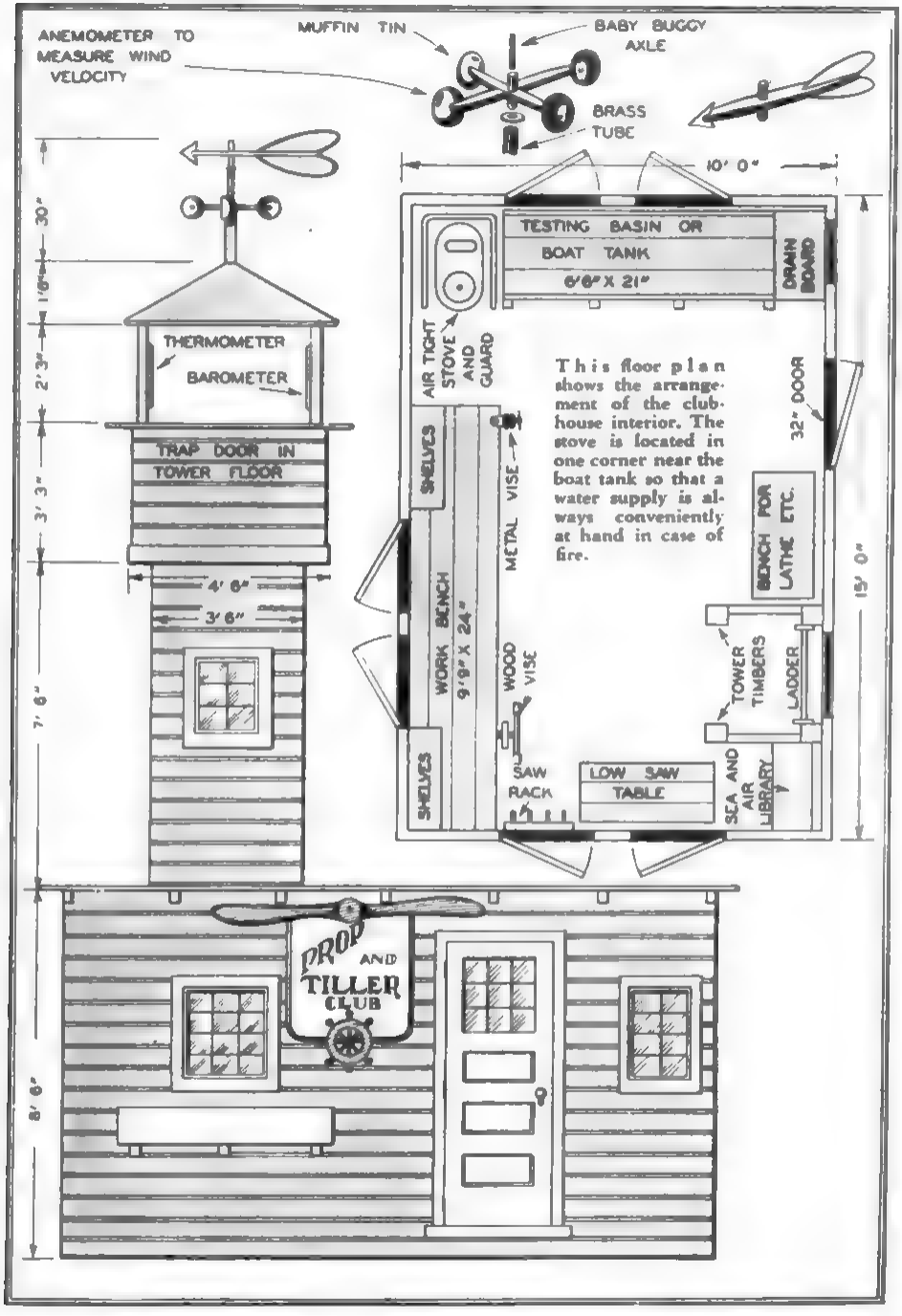
Boat Tank Is Popular

Three or four years ago we built a boat tank just like the drawings and it proved very successful, and a never-ending source of entertainment. By painting the inside white one can more easily follow the movements of toy submarines. Construction is simplicity itself. We used redwood boards, ¾ in. x 9 in. wide, beveling the edges so that hot tar could be poured into the cracks. It was absolutely watertight. We drained the waste water into a flower bed near by with amazing results in flower growth. A short pipe with tap on one end and coupling on the other supplies the tank from the garden hydrant.

By all means paint the clubhouse to match other buildings on the property. Or, if it stands alone, finish it in white with green door and window frames. You may be able to persuade an artistic friend to put the club escutcheon on the front wall in oils—the name surmounted by an airplane propeller, with a marine pilot wheel below.

There is nothing more delightful than, on a frosty morning, to work at a bench with the warm sun streaming in, a fire roaring in the stove and one of your own ideas in process of construction. And in fair weather club members can go aloft, read the weather records and launch their planes and gliders.

Real Workshop With Lots of Room Provided in This Clubhouse



The "Why"

Do you know the real reason why the toreador's red mantle angers the bull, or why the cross-wise seats are placed in the center of a street car? On these pages you will find the real scientific purpose for some of the simple things about which the average person has misconceived ideas.

Worry not about your red necktie as you cross a field containing several vicious-looking bulls. Recent tests prove that it is not color but motion which infuriates the bull. As a matter of scientific fact, bulls are far more susceptible to white as a color than red, but any erratically moving object, such as the toreador's flaming mantle, sends their temper skywards. Red is a popular color for the toreador because its brilliance adds to the spectacle of the bull fight.

The average person prefers to sit cross-wise in the street car, and even a lazy man will walk to the center seats for this purpose. Simply a matter of keeping the car exits clear!

Dragging chains ground electric sparks and prevent explosions. Why is the fire truck at the right painted red? Attention value—traffic clears out of the way.

# of IT ~

Of course, you have noticed the white crosses painted on the windows of buildings under construction, but do you know why they are put there? They are not daubed there accidentally by a whimsical painter. The scientific answer to this and other questions appears on this page.

WHY THE WHITE CROSSES IN THE WINDOWS OF BUILDINGS UNDER CONSTRUCTION?

What is the purpose of the white crosses of paint slashed across the windows of buildings under construction? Are they a sort of trade mark, union label, or just a contractor's custom? The real answer is—safety. The crosses prevent workmen from pushing planking through the windows or even walking bodily through the transparent glass. The paint, by its surface tension, also helps to prevent the glass from shattering under the vibration of hammer blows on the frame of the building.

WILL THE JUMPER LAND ON THE TRUCK OR IN THE ROAD?

A moving truck cannot run out from under a man jumping into the air from it. Velocity of the truck is imparted to the jumper.

Smoke rising straight into the air is a sign of fair weather. Smoke rises because the atmospheric pressure is great enough to lift it up; high pressure precedes fair weather.

After a year's work, John Demenjoz, of Bridgeport, Conn., has constructed a glider with 40-foot wing spread which will be expected to fly with sails as motive power in tests about to be conducted.

NEW GLIDER to SOAR WITH SAILS

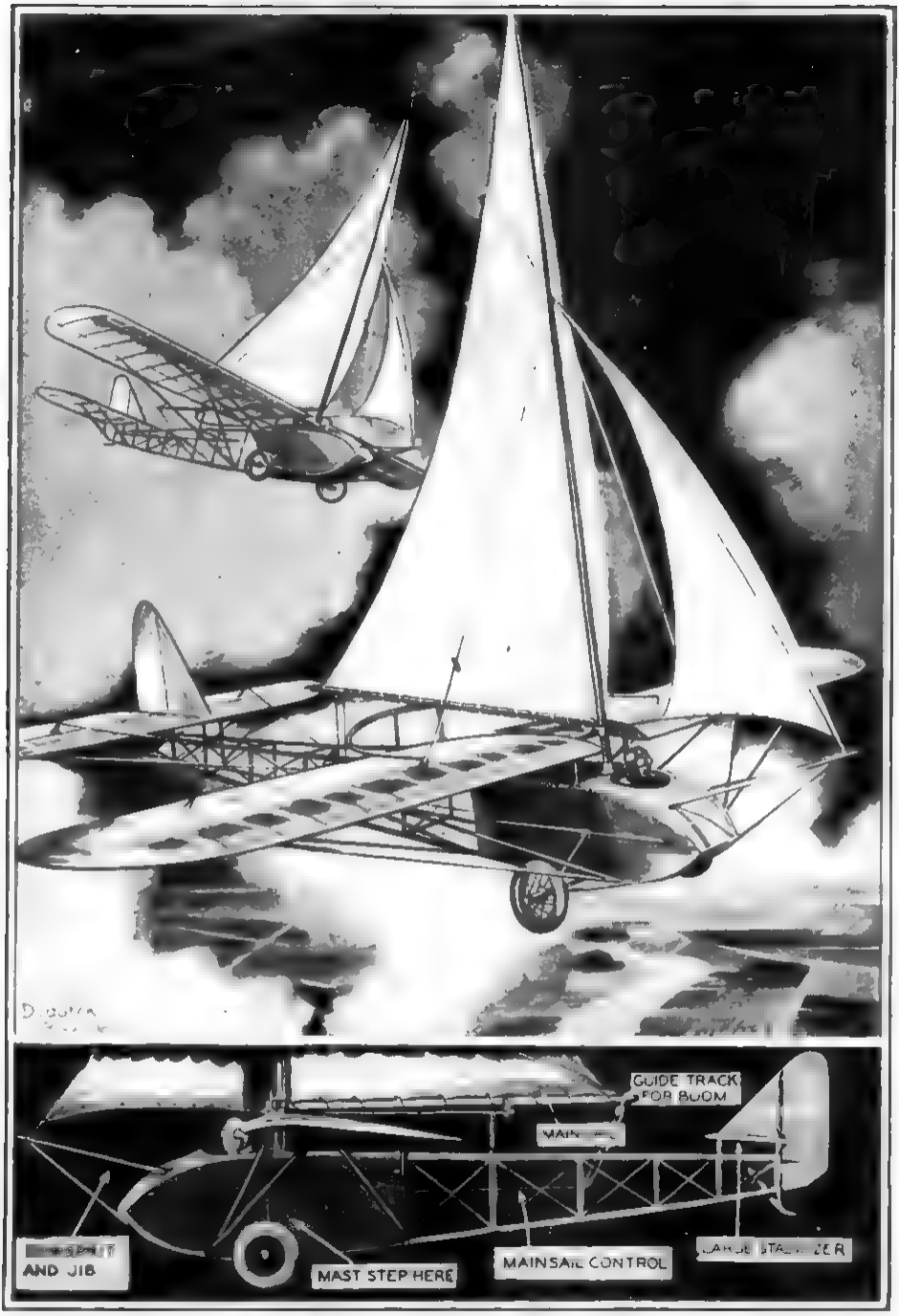
THE WORLD'S first sailplane, something new in gliding, has just been constructed by John Demenjoz of Bridgeport, Connecticut. This novel glider represents nearly a year of work. It has a 40-foot wing spread, is 30 feet in length, and altogether weighs less than 600 lbs.

It has no motor, and is to be propelled by wind only. Mr. Demenjoz is shortly to take his machine to Old Orchard, Me., where he will make it the location for the crucial tests of his new invention.

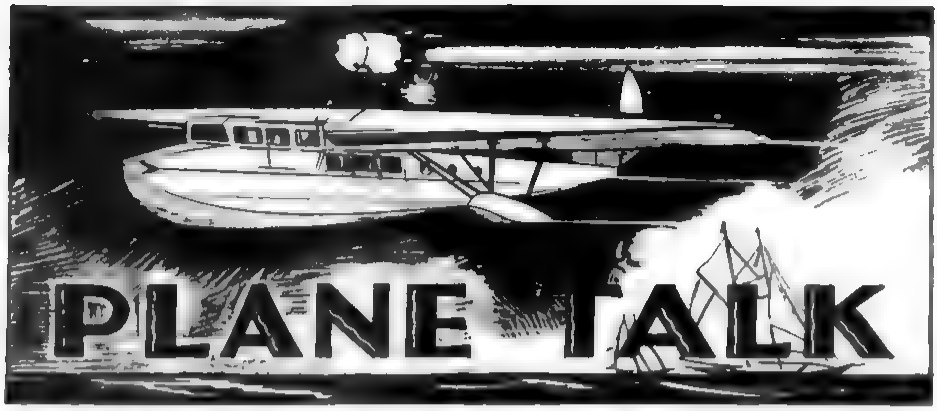
Original in his idea of making a plane go both ahead and into the air by the use of sails similar to those of a boat, the French inventor has carefully calculated all the requirements of stability, he says, and is confident that with a wind of 20 miles an hour he should be able to fly. He further predicts that he will be able to fly as high as there is any wind. He estimates his craft will attain a speed of 40 miles an hour.

The principle of making sails propel vessels and vehicles other than boats has been widely applied in the past to railway handcars, road wagons, and the like.

To the editors of MODERN MECHANICS, however, who are watching the forthcoming trials with much interest, it would seem that a more logical way for the application of the sail would be to have a counter sail under the landing carriage to balance the high center of effort of the present mainsail. This could be folded, and unfurled when in flight to add to speed and stability. That is, of course, providing the principles are sound and the glider actually flies. At all odds the inventor is to be complimented for his innovation and for his enterprise.



In this drawing Mr. Demenjoz's invention is graphically depicted by Douglas Rolfe, aviator-artist. Using a sloop rig, the glider is expected to average 40 m.p.h. It will be tested at Old Orchard, Maine.



Edited by MAJOR H. H. ARNOLD

Modern Flyers Have Their Own Expressive Slang Terms

"SAY, bird, did you see that Kiwi (pronounced kee-wee) pancake his crate when his stick went dead?"

That is not a translation from a foreign language. It is an expression which may be heard around any airport in the United States.

Here's another one—"I was hanging in the air when the engine konked, my stick died and everything went haywire. All of a sudden I saw the hitching post for the rubber cow ahead of me. I flopped into a cow pasture but made a field officer's landing."

When those two examples of aviator's parlance are interpreted they tell complete stories. "Say, bird"—that indicates that one pilot is talking to another. Furthermore, each has deep respect for the other's ability as a pilot or he would not use that expression. "Did you see that Kiwi" —evidently neither one thought much of the fellow who was flying or they would not have used the word Kiwi. A Kiwi is a bird that does a lot of running around on the ground and makes a lot of noise but can not fly.

Then he "pancaked his crate." Bus, crate, air wagon, kite and ship are all used when referring to airplanes. "Pancake" is a very expressive term used to denote an improper landing in which the pilot drops his plane to the ground without flying speed.

"His stick went dead." There are two sticks in an airplane. The joy-stick is the control stick by which the pilot controls his plane. It is located in the cockpit between the pilot's feet. The other stick is the propeller. Either stick may "go dead." The control stick is not effective and accordingly dead when the plane is in a stall. When the engine of a plane stops the propeller may either "go dead" or continue to revolve.

Major H. H. ARNOLD

One of the pioneer figures in the world of aviation, Major Arnold is admirably qualified to serve as editor of this monthly aviation department of Modern Mechanics. He was present at the first demonstrations of the Wright plane as an official government observer, and ever since that time he has been actively engaged in some branch of flying. During the war he was assistant chief of the Air Service.

Now the entire story is clear. In ordinary words, one pilot says to another, "Say, fellow, did you see that half-baked aviator make a rotten landing and drop his plane to the ground unnecessarily hard when his engine stopped in the air?"

Now the other story. "Hanging in the air"—this infers that the pilot was either flying very slow, just fast enough to maintain flying speed, or he was flying against a very high wind. The wind must have been strong enough

to keep the plane from making very little progress over the ground.

"The engine konked"—his engine went dead. He had no power to continue flying at that altitude. He had no option as to what he must do. He had to glide down for a landing. "My stick died"—it may have been his propeller stood still due to a breakage in the engine, or due to his flying so slow that there was not sufficient speed to keep it revolving.

"Suddenly I saw the hitching post of the rubber cow." The pilot had just secured control of his plane when he saw an obstacle in front. "Hitching post of a rubber cow"—that does not sound sensible but it means a lot.

A "rubber cow" is the term applied to small airships or blimps. They are rather unwieldy and awkward when compared to airplanes, hence the term cow. Airships are housed in hangars but when there is no hangar available, they are secured to a mooring mast. Hence the term "hitching post for a rubber cow" signifies that there was a mooring mast for a small airship or blimp nearby.

"Flopped into a cow pasture"—that would indicate that he was not able to reach the airdrome and had to use a nearby field. His landing was not so good or he would not have "flopped"—he would have landed.

Then again he made a "field officer's landing." That is a term originated during the World war. The field officers of the Air Service did not do the amount of flying that the younger officers did. It may have been due to their not having the time on account of the administrative work or it may have been that the field officers did not have the inherent ability.

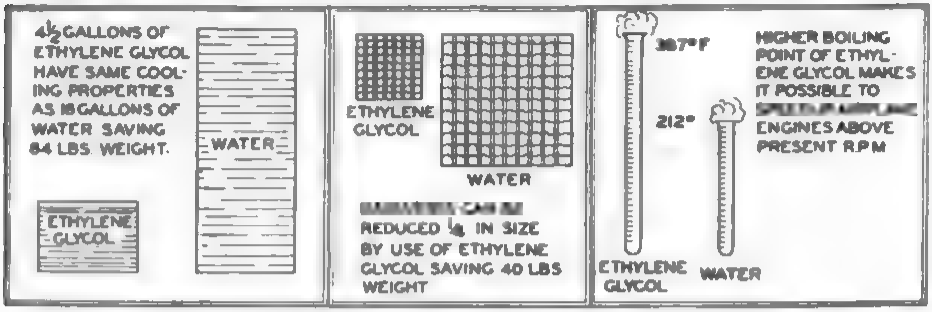
As the landing of one field officer was described, "He came in and landed with graceful leaps and bounds." This at once indicated that he had a rather hard time keeping his plane on the ground. Evidently he did not make a three point landing in which the wheels and tail skid all drop lightly to the ground at the same time. His wheels evidently hit first and he bounced. The first bounce made another practically a sure thing. After that there was one bounce after another. The "graceful leaps and bounds" was evidently inserted to take away some of the sting attendant to the rough landing.

What a Well-Dressed Flyer Wears

CLOTHING oneself properly for high altitude flying is not the simple problem it might appear to be at first glance, as a study of the above picture will reveal. An electrically heated flying suit, lined with warm fleece, is indispensable to the airman who penetrates to the rare atmosphere five miles and more above the earth. He must also wear a face mask to protect his skin from the freezing blasts. Even for ordinary flying a leather helmet and goggles are necessary equipment. In the old days helmets of various types were used, some of which contained protective devices such as a series of coiled springs to absorb shocks of crashes, but the additional weight and bulkiness of these helmets caused them to be discarded in favor of the soft leather variety.

Goggles, too, have been developed from celluloid and ordinary glass until now the standard goggle is of laminated glass construction which will not splinter when broken. The lenses are constructed by mounting several thin sheets of glass one upon another, binding them together with a transparent adhesive.

New Cooling Fluid Saves Radiator Weight in Airplanes

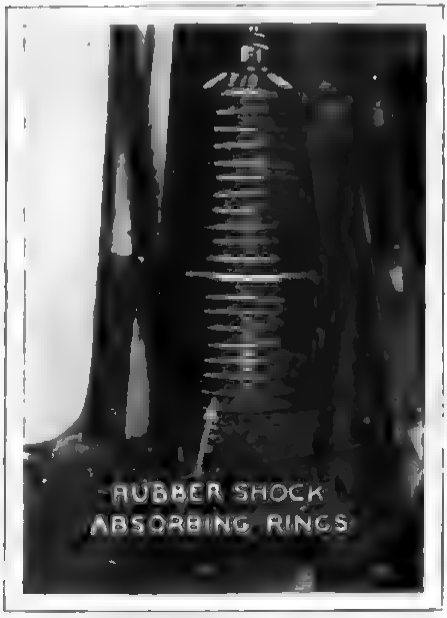


DEVELOPMENT of a new cooling fluid for engine radiators which is four times as efficient as water in proportion to its weight is heralded by engineers as being of tremendous importance to airplane motor builders. The diagram above presents an interesting comparison of the new fluid, known as ethylene glycol, with water. Strictly, ethylene glycol is not a *new* liquid, for it has been long familiar as the simplest of what chemists call polyhydric alcohols.

The vee and the in-line type of motor is expected to enjoy a revived popularity through the use of ethylene glycol as a cooling agent. These types of motor have several advantages over the radial type; for instance, they afford greater visibility and less wind resistance. They have given way to the radial air-cooled type simply because the latter delivered more power per pound of weight. With the reduction of radiator size and consequent lessening of weight, the liquid-cooled motor will very likely enjoy a return of popularity, particularly since such engines are adapted to high crankshaft speeds and the employment of superchargers and reduction gearing.

A gain of more than 100 pounds in the useful load results from using the fluid.

Circular Rubber Rings Absorb the Shocks of Airplane Landings

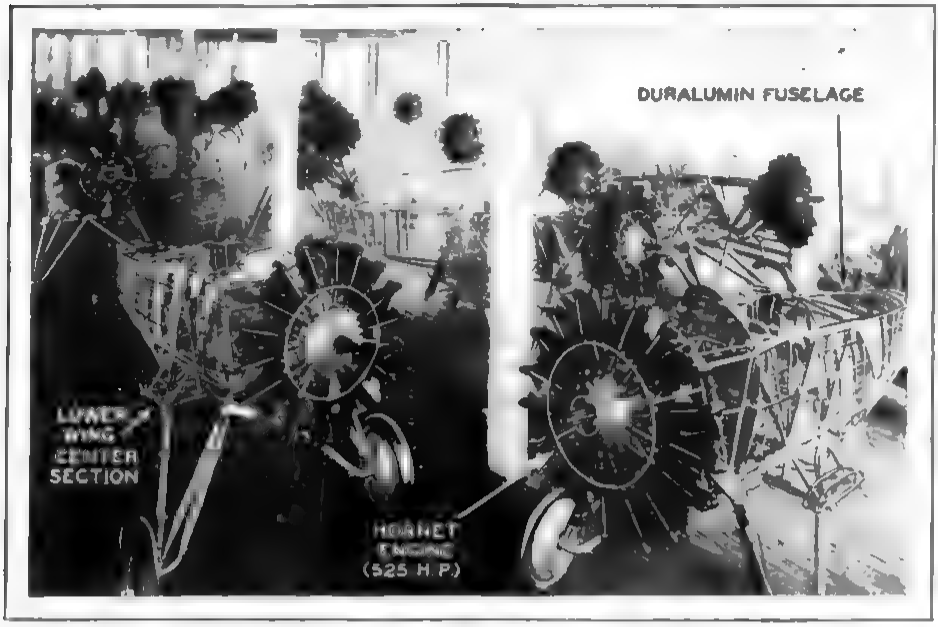


ONE OF THE favorite types of shock absorbing devices in use on the landing gear of airplanes is pictured in the photo at the left. A number of circular rings of pliant rubber are arranged, one above the other, so that the strain occasioned by the wheels bumping heavily upon the ground is easily absorbed without any chance of damage to the plane.

Airplanes and Shipwrecks

TESTS recently made as to the practicability of an airplane's carrying a rescue line out to sea and dropping it across a stranded ship proved the idea to be practical. Three thousand feet of flexible steel cable, wound on a drum in the plane with one end anchored to the ground, was successfully carried by plane for three-quarters of a mile and dropped across a structure representing a stranded ship. The airplane had no difficulty in carrying the cable.

Demand for Planes Puts Industry on Production Basis



UNTIL a few months ago practically every airplane manufactured in this country was an individually produced job —that is, the industry had not yet arrived at a place where the demand for its product was great enough to enable it to cut corners in production costs by turning standard parts out in large quantities. Today, however, it is quite different; the airplane industry is approaching the same standards of quantity production which have characterized the automotive factories for many years.

The photo above was taken in the assembling room of the Boeing airplane factory, and shows a number of Navy fighters in the process of construction. Bear in mind that this is only a small corner of one huge factory devoted to the fabrication of airplanes, and it will easily be understood that flying has emerged from its swaddling clothes.

The Aerial Ambulance

IT HAS long been apparent that much quicker relief could be given to injured in many cases if time could be saved in getting them to a hospital. Accordingly the U. S. Army Air Corps has been working to secure a practical aerial ambulance.

A transport plane is normally used for this purpose. The interior of the plane is remodeled to take care of both lying and sitting cases. Emergency medical supplies are contained in kits always available in or near the ambulance.

In case of need, either from an airplane accident or emergency case at some distant point, the ambulance pilot and medical officer hop into the plane and reach the sufferer within a very few minutes. Such service is particularly valuable in the Panama Canal Zone where there are few roads and much jungle.

An idea of the work done by these aerial ambulances operated by the U. S. Air Corps, may be obtained from the following figures, for the past year—

Cases Transported	Distance Covered	Time Taken	Time Saved
22	3755 mi.	45 hrs.	320 hrs. 40 min.

The time saved totals somewhere near 17 days.

Bernard Shaw's Rotating House Is an Aid to Health

George Bernard Shaw revolving his workshop.

A REVOLVING turntable is one of the factors in the splendid health of George Bernard Shaw, famous English author. At the age of 72, he is in the prime of physical condition and attributes it partially to his appreciation of sunlight. Mr. Shaw has a plan to keep the sun shining on him constantly while he works. He has constructed a small hut on his grounds that is built on a turntable. When the morning sun shifts, he merely places his shoulder against the side of the hut and gives it a push so that the warming beams fall through his window at the correct angle.

Mr. Shaw's plan to keep the sun shining on him is a simple health measure, and not a wanton eccentricity.

The house is not a new idea. Several years ago such a building was constructed in France. It was built with glass walls and was equipped with a motor that moved it at the touch of an electric button. The original model cost $50,000. Mr. Shaw's cost much less than $1,000.

The author has spent most of his life out of doors, but when he moved to London he didn't get as much sun as he thought he needed. Hence the hut.

Tractor Escorted By Motor Cops

CONSTABLE George Harrison of Evanston, Ill., specializes in writs of replevin. He was sent out recently to replevy a tractor. Constable Harrison had never driven a tractor, but he had once pumped the pedals of the family sewing machine. He therefore thought it would be easy. He got the tractor going. So smooth was his progress to town that he began to feel thoroughly satisfied with himself. Glancing ahead he saw a traffic signal turn red. This contingency had not occurred to him. He pulled a few levers and pushed a few pedals, but the tractor moved steadily on.

Two motorcycle policemen came bearing down on him. They told him to pull over to the side.

"Twould do no good," Constable Harrison replied, "and it would be fatal to the curb. What I need is information on how to stop this thing."

No one seemed to know, so the tractor moved sedately along, now convoyed by two motorcycle policemen. 'Round and 'round the city they went.

The constable finally had a new idea. "I'll run her into the lake," he shouted. As he did, water choked the carburetor.

Day or Night Deposit by Chute

RECEIVING bank deposits and carrying them through a steel chute to the vaults, a day and night depository service has been inaugurated by a bank in Oakland, California. Built into the masonry, the chute is wired with burglar alarms and is safe from possible theft. Women may safely deposit jewelry in the evening.

Young woman depositing money in chute of bank

Girls Dive Into a Pool of Oranges in Fete Competition

THREE tons of oranges recently floated in the municipal swimming pool of Anaheim, California, for the obstacle race put on in preparation for the selection of its representative in the annual Valencia Orange show held there. Almost a score of girls from Anaheim high school swam 200 feet through the floating fruit in the competition.

Unless a swimmer knows the correct manner to enter the water in a dive, he can receive a stinging slap from the impact of his body hitting the surface at the wrong angle. How good, then, must a diver be to hurl himself headlong into a pool of oranges without getting a black eye or a bruised nose? These girls shown above are doing just that. And none of them was hurt. They made up one of the heats of the race.

Battles Octopus to Save Friend

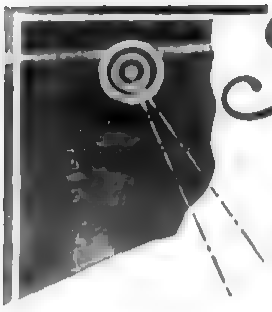
HELD in the terrifying grip of an octopus' tentacles, T. Vangioni, who had been swimming in Akarca harbor, New Zealand, was saved when a friend dove in and beat off the brute with a club. Vangioni was on the point of collapse when rescued.

He said that he had dived into deep water, when the octopus seized him.

Automatic Chicken-Plucker

APPLICATION of the principle of the vacuum sweeper has been applied to this device shown below so that it automatically plucks fowl in a few minutes' time. The bird is held against a rotary "grill", enclosed in a cylinder, through which suction passes as in a sweeper. As the feathers are separated by the air current, they come in contact with a metal plate, equipped with several catchers which pluck the feathers and fine down when rotating.

Suction carries feathers into a bag in machine.



Archery is Real Sport

By JAMES BATES

Probably the bow and arrow will never regain its ancient popularity as an offensive weapon, but during recent months archery has come to the fore as one of America's popular outdoor sports. A bow built after the instructions in this article will equip you for the sport.

DOWN through the ages, and today, the thrill of planting an arrow in the gold at sixty yards is as keen as ever. Believe it or not, there's real sport in this thing called "archery."

Of course, you must have the target, the bow, and the arrows. Let's take the bow first:

An ideal wood for bow construction is Southern red cedar, and a length of this easily worked wood, 6 feet long by 1 1/16 inches wide by 15/16 inch thick can be secured at any lumber yard. The wood should be well-seasoned, straight-grained, and free from knots.

Now, make three pencil marks on your stick, one around the exact center, and the other two, 2 inches on either side of this, as in Fig. 1. At either end of the stick and on one of the broad sides, make marks 5/8 inch apart and with a straight edge draw lines from these marks to the outside marks at the center. Plane away the ruled-off section at either end, as indicated by the shaded portions of Fig. 2.

One of the broad sides of the stick is then tapered, from zero at the center to 3/8 inch down from the surface at either end, as shown in Figs. 3 and 4. This is the back of the bow.

With a small plane, round the inside of the bow until sections of it appear like those shown in Fig. 5. At points 1 inch from each end, cut notches with a half-round file, slanting these from the back to the inside of the bow, as in Fig. 6.

So much for the bow—for the time being. The bow-string comes next. Get a spool of good-grade white linen thread. Run twelve strands of this between two nails driven 6 feet 8 inches apart. Detach one end of this group and twist it tightly into a firm string. Make two other strands of the same size and in a similar manner, and then place the three strands together and twist them tightly together. The separate strands should be twisted in a *clockwise* direction; the completed string should be twisted counter-clockwise. Wax the string with beeswax. Make eye splices at each end of this string and wrap the loops thus formed with strong linen thread, as shown in Fig. 7. You should measure the string carefully so that the bow, when strung, will be six inches from the string at the center.

Stringing the bow calls for some technique. Do it like this: Slip one loop of the string over one end of the bow, letting it slip past the notch. Place the other loop in the notch at the opposite end of the bow. Now place

When the bow is strung in the manner shown in Figure 8, it must be carefully checked for balance as shown to make sure that both limbs bend to the same degree. If the bow is too strong, lacking in flexibility or is off balance in any part, take a small plane and narrow down the wood here and there to obtain the desired results.

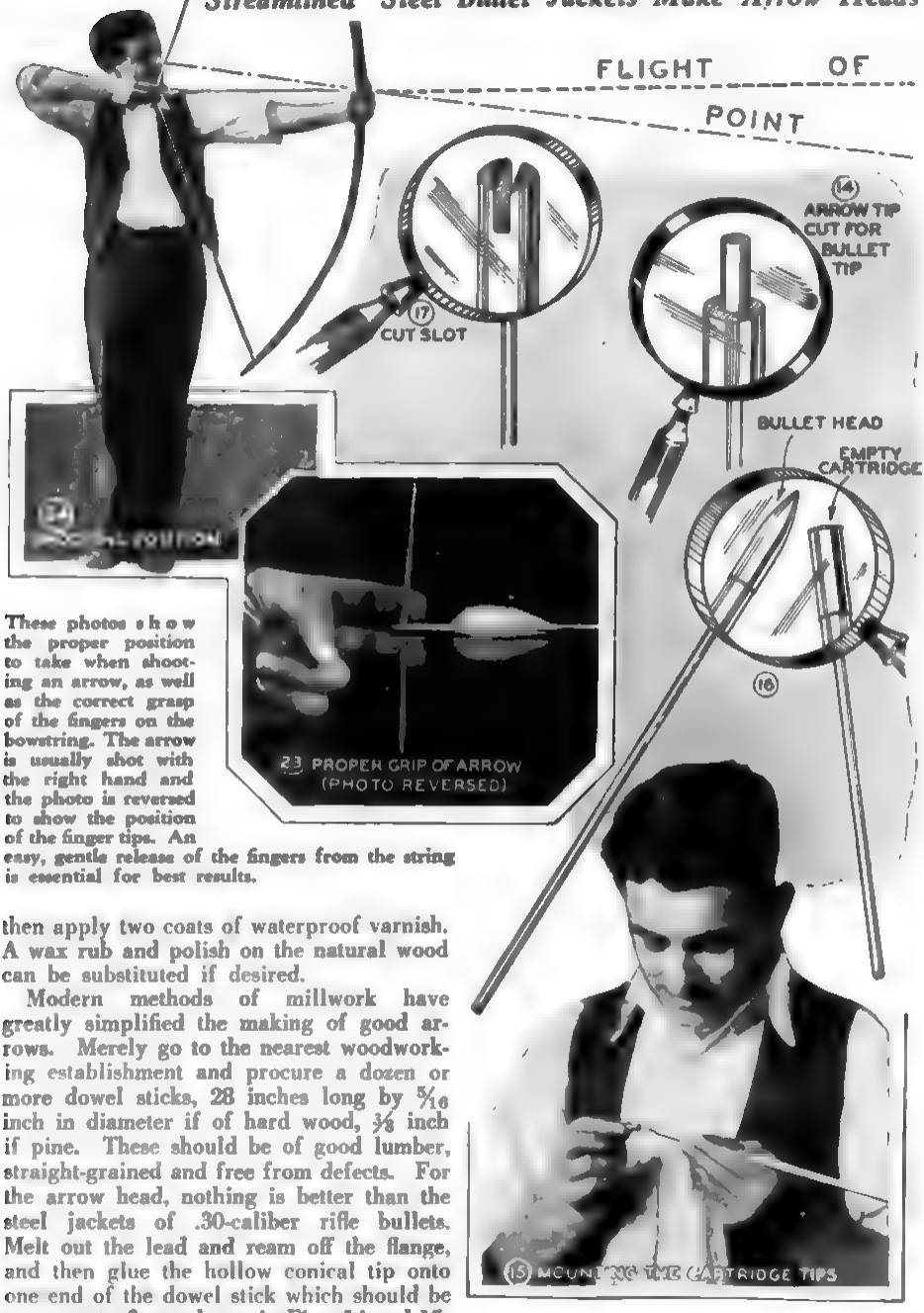
the end with the loop in the notch against the outside of your right foot. Grasp the upper end of the bow with your left hand. Hold the free loop ready with your right hand. By pressing the bow firmly with the right knee, as in Fig. 8, you will find it an easy matter to slip the loop over the notch at the upper end of the bow.

After the bow is strung, give it the once-over, as in Fig. 9. Do both limbs bend alike? Is the whole bow a trifle too strong? Your answer should be given with a small plane, cutting off here and there until the wood bends evenly and strongly with the string 28 inches from the center of the bow.

Now, take a soft piece of wood, 5 inches long and ¼ inch thick, and plane it down along both sides and ends, leaving but one flat surface, as shown in Fig. 10. With good glue, fasten this piece to the back of the bow so that one end will be 1 inch above the exact center, as shown in Fig. 11. Cover this handle with a piece of plush or velvet, glued on. The ragged edges should be finished off with strips of leather as shown in Fig. 12. Each end of the bow, immediately below the notch, should be wrapped with linen thread to safeguard against splitting. Mark the longer limb of the bow so that you can tell it from the shorter limb, as the long limb is always held up when shooting.

All set for the finishing touches. Scrape and sand the bow to a smooth finish, and

Streamlined Steel Bullet Jackets Make Arrow Heads



These photos show the proper position to take when shooting an arrow, as well as the correct grasp of the fingers on the bowstring. The arrow is usually shot with the right hand and the photo is reversed to show the position of the finger tips. An easy, gentle release of the fingers from the string is essential for best results.

then apply two coats of waterproof varnish. A wax rub and polish on the natural wood can be substituted if desired.

Modern methods of millwork have greatly simplified the making of good arrows. Merely go to the nearest woodworking establishment and procure a dozen or more dowel sticks, 28 inches long by $\frac{5}{16}$ inch in diameter if of hard wood, $\frac{3}{8}$ inch if pine. These should be of good lumber, straight-grained and free from defects. For the arrow head, nothing is better than the steel jackets of .30-caliber rifle bullets. Melt out the lead and ream off the flange, and then glue the hollow conical tip onto one end of the dowel stick which should be cut away to fit, as shown in Figs. 14 and 15. For blunt heads, empty central fire .32-calibre cartridges serve the purpose quite nicely. Both types of heads are shown in Fig. 16.

The conical steel jackets of .30 calibre rifle bullets make ideal arrow tips, mounted as shown in the drawing above.

Trim Feathers Carefully for Accurate Marksmanship

Aiming an arrow is not accomplished by sighting along its length as in the case of a rifle barrel, for the eye of the archer is necessarily a few inches above the feathered arrow tip. The line of aim therefore leads from the eye through the arrow tip to a point a short distance below the actual mark aimed at. The point of aim varies considerably with individuals and must be determined by experiment. Wind velocity and other factors also must be allowed for—that's what makes archery such a fascinating sport of individual skill! Careful construction of bow and arrow is essential if best results in marksmanship are to be attained.

Three geese or turkey feathers, trimmed as shown in Figure 21 and mounted on the arrow as in Figure 20, serve to direct the arrow along a straight course when shot.

At the other end of the dowel stick, saw a slit ¼ inch deep. Enlarge this with a knife and finish with a round file, making the nock appear like the one shown in Fig. 17.

Feathering the arrow comes next. For this, procure a considerable quantity of geese or turkey feathers and strip off the broad side by beginning at the end and working towards the quill, as shown in Fig. 18. Cut your feathers into pieces 2 inches long. Take one of these pieces and glue it to the arrow, 1¼ inches from the nock and at right angles to it, as shown in Fig. 19. This is the "fly" feather and should be stained a different color from the other two. The two other feathers should be glued into place, one-third the circumference of the shaft from this fly feather, as shown in Fig. 20. After the glue has dried, trim the feathers neatly with a pair of scissors, as shown in Figs. 21 and 22. The arrow should then be varnished and painted, preferably in brilliant hues, as this renders them more "findable" when shooting in tall grass.

The Proper Shaping of Bow for Balance Is Important for Best Results

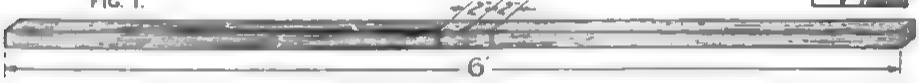
And now to shoot! For a target, you can either buy the regulation outfit, make your own from an old mattress covered with a piece of oilcloth, rig up a dummy figure stuffed with straw, or merely "shoot."

Whatever your target, stand at right angles to it, with your feet close together and on a direct line with the center of your objective. Grasp the plush handle of the bow with your left hand, making sure that the long limb of the bow is up. Fit the arrow into place, fly feather to the extreme left so that it will not catch on the bow when released, and let the shaft of the arrow rest on the base of the left hand thumb. Tilt the bow slightly to the right to keep the arrow well in place. The arrow should then be pulled back with the first and second fingers of the right hand, the string resting as close to the tips of the fingers as possible, as pictured in the reversed photograph—Fig. 23. Pull the hand back until it is directly under your chin, as shown in Fig. 24.

Now, consider your aim. You cannot sight directly along the arrow in the manner you would sight a rifle. Rather, you should look directly over the tip of the arrow to a point somewhere in front of the target. This particular spot on the ground is known as the "point of aim" and must be determined by experiment. It varies considerably. If you are shooting further than forty yards, the arrow will plane upwards slightly as it flies, so an allowance must be made for this uplift. Then, too, the direction and the velocity of the wind must be taken into consideration.

At any rate, you loose the string and the arrow flies. Accuracy, once the point of aim has been determined, is largely dependent upon the smoothness with which you draw and release the arrow. The fingers should slip gently from the string without jerking; and the left arm must hold its position firmly until after the shot is made.

FIG. 1.



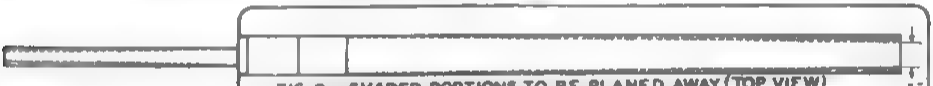


FIG. 2. SHADED PORTIONS TO BE PLANED AWAY (TOP VIEW)

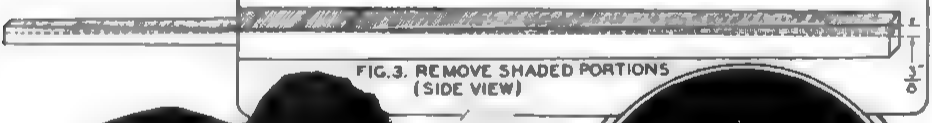


FIG. 3. REMOVE SHADED PORTIONS (SIDE VIEW)

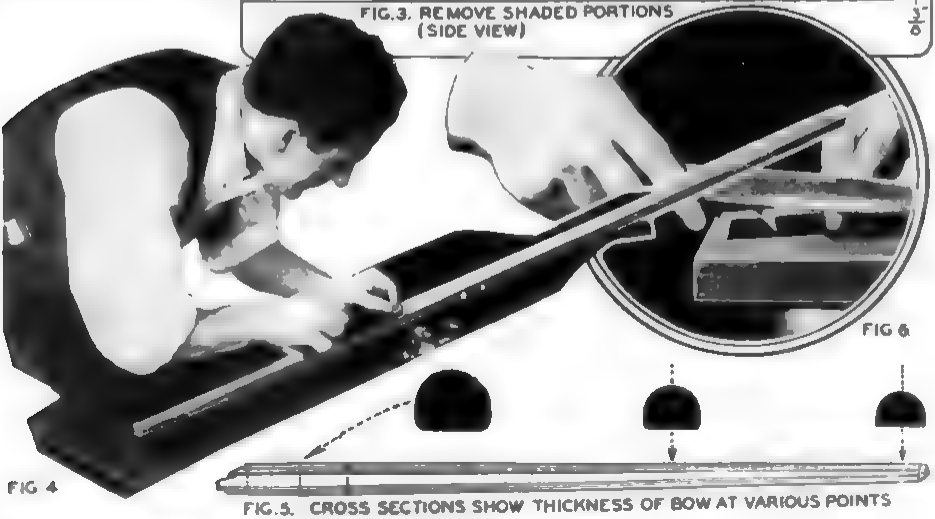


FIG 4

FIG. 5. CROSS SECTIONS SHOW THICKNESS OF BOW AT VARIOUS POINTS

FIG 6

The "How" of Atmosphere Behind the Scenes in Radio

HOW RADIO effects are produced over the air is shown in the photo above. Fans listening to the boom of cannons, the roar of waterfalls or the shouting and cheering of a prize fight crowd have often wondered just how radio players accomplished this. "Napoleon's Retreat from Moscow" is shown being produced above. The men with the chains represented the marching soldiers and prisoners. Various musical instruments added atmosphere and tin cans boomed like cannons.

Automobile, Made by Hand, Runs Speedily on Either Land or Water

WITH the exception of the motor, this amphibian automobile shown below was built entirely by hand. Special axles were forged to provide for the double duty which it must perform either on land as a car or in water as a boat. The push of a clutch on the floorboard transfers the power from the rear axles to propellers in the rear. Special side windshields keep spray from wetting passengers when in the water.

The extreme length of this water-car allowsit to travel at a fast rate in the water.

Builds Plane in Parlor While Neighbors Wonder at Noise

THE mystery of all the pounding and sawing neighbors heard in the home of Peter Lepicer, of Brooklyn, N. Y., was solved when he moved a two-seated monoplane which he built in his parlor. Workmen were required to tear part of the building away in order to get the plane out of the house.

For several months residents in the neighborhood were at loss to explain the noises resounding from Mr. Lepicer's home. Questioning him brought no response other than a wise nod and, "Wait and see." They waited impatiently while all sorts of queer ideas brewed as to what he was doing. When they found out they were astounded.

The plane was complete with the exception of the propeller, wings and landing gear, which he connected when he had extracted the ship from his parlor.

Wreck Old Chicago Sky-Scraper

WRECKING of the old 14-story Tacoma building in Chicago, Ill., marks the end of the first real skeleton type structure built in which masonry served simply as a curtain.

It has been standing on the northeast corner of Madison and LaSalle streets since 1887. A 49-story building, the tallest skyscraper in Chicago, will now supersede it.

Monkey Thinks Flying Is Okay

THIS chimpanzee shown below has developed a tendency toward air-mindedness. Miss Peggy Manor recently took him up for a ride. Since then, every time he sees or hears a plane he goes through a series of antics and contortions in an effort to tell his keepers that he wants a ride.

Whenever it is possible, attendants of the Los Angeles monkey farm, which is his home, let him take a ride if the pilot is willing. He has a special pair of goggles and a helmet, which he wears with great dignity when he gets an air ride.

Monkey strapped in seat like a regular passenger

This Self-Winding Wrist Watch Requires No Attention

WORKING on the same principle as that of a pedometer, this new watch at right winds itself while strapped to its owner's wrist. After wearing it for three hours it will run for 30 hours without stopping!

A small weighted pendulum which jogs up and down as the wearer moves his wrist about winds the watch. A tiny lever locks it when the timepiece is wound. It is therefore not possible to break the main spring by winding too tight.

The watch was invented by John Harwood, English watchmaker. A new company capitalized at $800,000 is being formed to market the device.

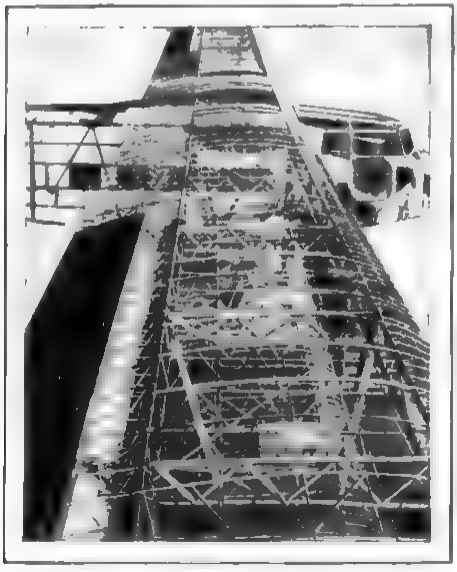
A person wearing one of these watches need never worry about missing out on an important event because his watch ran down and stopped. It is merely put on his wrist and forgotten except to note the time of day.

Winding-pendulum of watch fits easily in case.

A New Sky-Scraper? No, an 80-foot Wing of Giant Passenger Plane

THIS striking view shown below is one photographed from the end of the upper wing of a new Boeing 18-passenger transport plane. Its wing span measures 80 feet. Note the insulation and soundproofing on the fuselage. This minimizes the tremendous roar of the three 525 h.p. "hornet" motors which power the ships and enable them to make a speed of 135 m.p.h.

The pilots' compartment may be distinguished in the photo at the extreme right. It is designed expressly for comfort in order that the men who guide the huge planes on long treks through the clouds do not have to pilot the ships under adverse conditions of cramped quarters and hard seats. The new planes are being flown between Chicago and Oakland, California. Regular trips are made, and the service is being patronized both for business trips and pleasure.



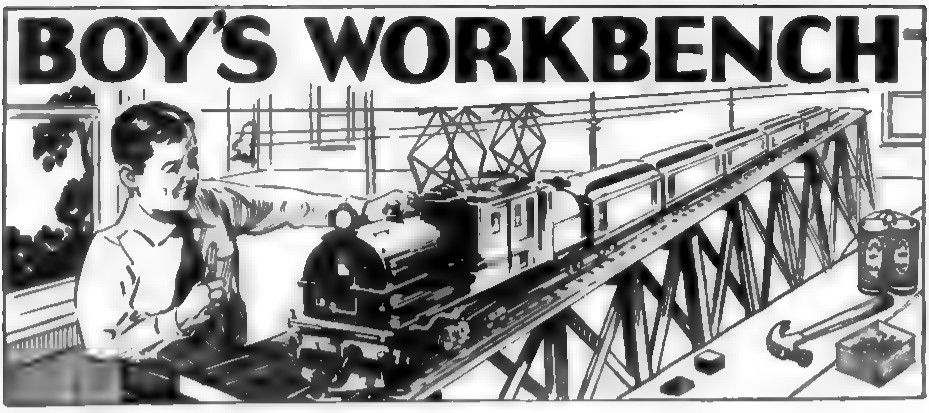
Uncovered wing of a new Boeing transport plane.

Motors Make Fishing Safer

AUXILIARY motors carried by fishing schooners enable the boats to move safely out of tenacious lee shore waters when a sudden shift of wind leaves a ship in their power. When the wind dies with a ship in such a position or a squall arises, a boat equipped with an emergency motor merely cruises out of it. An all-sailing craft would be in dire need of help in similar conditions.

All fishing boats are being equipped with these auxiliary gasoline engines. In the past several years a number of fishing schooners have been lost with men aboard as the result of inability of the all-sail boats to get out of a storm or away from dangerous rocks.

BOY'S WORKBENCH



Edited by A. NEELY HALL

Author of "The Boy Craftsman," "Carpentry and Mechanics for Boys," etc.

Mr. Hall is known throughout the country as an expert in the field of handicraft work for boys, and thousands of young Americans look forward every month to the building of Mr. Hall's latest designs in their own home workshops. This department is a regular feature of Modern Mechanics magazine.

Tobacco Tin Makes Excellent First Aid Kit

ONE WOULDN'T suppose it possible to pack a dozen first-aid appliances in a tobacco tin, yet the 12 articles spread out upon the table in the photograph slip in with ease, leaving room for additional safety pins or other small articles. It would be hard to find a better container than the tobacco tin, since it is shaped to fit the pocket, and can be carried in outing shirt, coat or trousers. This is the type of kit to make for scout hikes, fishing trips and bicycle rides. Have it always with you.

It's hard to believe that all the first-aid items lying on the table will fit into a small tobacco tin.

Here are the contents of the kit: 1 1-inch gauze bandage 3 yards long, 1 2-inch gauze bandage 5 yards long, 1 roll 1-inch adhesive tape, 1 iodine applicator, 1 packet of court plaster, 1 2-dram bottle of aromatic spirits of ammonia, 4 safety pins, 1 pair of tweezers and 1 pair of small scissors.

If you cannot get 2-in. sterilized gauze in a 5-yard roll, buy a 10-yard roll, unwind one-half of it, and seal up the unwound portion in the original package, being careful not to touch it with your hands. All of the articles, except the small scissors, can be purchased at a drugstore. Maybe mother can supply the scissors. A pair of nail or manicure scissors will do.

The tobacco tin requires no alteration. But it should be refinished. Remove stamps and labels, and rub down the surfaces with fine sandpaper. Then lacquer or enamel grey or blue, and add a small red cross upon one side.

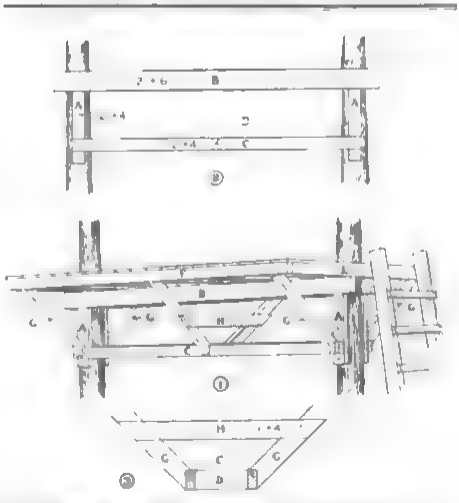
If you are unacquainted with first-aid methods, buy a Boy Scout handbook, or ask at a drugstore for one of the first-aid manuals published by manufacturers of surgical dressings.

Building a "Tarzan" Tree Hut

This willow tree with its numerous spreading branches is ideal for the construction of a tree hut according to the plans presented below by Mr. Hall. A drawbridge makes the hut inaccessible.

IF YOU want to experience the sensation of a wild ride with the airmail, select a night when the weather man predicts "whoopee," don a helmet, goggles, leather jerkin, or what have you, and seat yourself in a swivel chair in the highest tree hut you can find. To help the imagination, take along a flash light and a book of airplane adventures. However, you won't need these after the storm breaks. Boy! Feel those air bumps! You zoom to get above the storm. You roll! You side slip! Then, crash! The wing has crumpled! You're in a tailspin! You grab your 'chute! You throw open the cockpit (or hut window)! Wow! The wind takes away your breath! The rain slashes your face! A flash of lightning! All about you empty space! Another flash! Tree branches are revealed below! You are about to crash! Too late to leap!

A good test of nerve, this, for you fellows who expect some day to pilot a plane, under



Where only two trees are available for supporting the tree hut, the floor bracketing plan shown in the diagram above will prove very satisfactory.

The gang's all up in the air in the tree hut shown in the photo above—twenty feet above the ground. Note how the floor is anchored to limbs.

varied weather conditions.

Undoubtedly, there has been an increase in the construction of tree huts in the past year. In a recent motor trip, I came upon dozens of them, some finished, many in the course of building. Aviation is having its influence on the airminded, suggesting the tree cabin as next best to owning a plane.

Where is your tree? Each tree has its particular problem. A tree with many branches affords excellent support for a hut. A straight tree with a few large branches may have a hut built around it, supported upon brackets. A group of two, three or four trees may have a hut hung between them.

The photograph shows a hut built between the branches of a willow tree by Boy Scouts of Villa Park, Illinois. The hut is not one of beauty, but new lumber was not available and the boys had to do the best they could with boards from a tumble-down barn. That is often the case, and the gang's specifications call only for a substantial foundation, a tight roof, a door and window, bunks, a stove, and room enough to turn around in.

Tree Branches Support Floor

A diagram shows how the foundation of the willow-tree hut was framed with tree branches. If 2-by-4s or 2-by-6s are available, it would be better to use them, because of the greater ease of spiking them in place. Branches used for floor sills and joists must be thoroughly tested for strength and their bark must be removed to prevent rapid decay. In addition to the framing shown in the diagram, a post extends from the tree crotch to a girder placed under the center of the floor for reinforcement; and there are block supports and diagonal braces. A careful study must be given to the framing, because each member must be secure, with no possibility of its racking loose in heavy wind. Bolting may be best in some places, anchoring with strap iron in other places.

With the framing completed and floored over, setting the wall studs, sheathing them, and constructing the roof will be quick work.

Make a lean-to or a gable roof, with a rise of at least 3 inches to the foot, to give it adequate pitch to shed rain. Lay the roof boards close together, then cover them with heavy roofing paper.

Sash Window Is Best

A screened window with wooden shutter is sufficient for warm weather, but a sash of the size used for basement and garage windows is not expensive, and you will need it unless you expect to abandon the hut for the winter. Perhaps you can find an old sash. It will be no trick to reglaze a broken light or two.

A battened door is good enough, with pioneer latch and latchstring. If you install a stove, place a sheet of galvanized iron under it, and protect the wall behind it with another sheet, or with a sheet of asbestos; also protect the wall or roof through which you run the stovepipe.

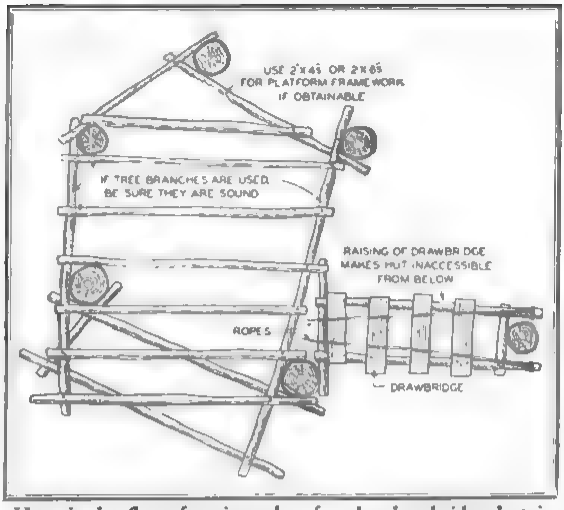
Double deck your bunks. Maybe you can

pick up two discarded bed springs or borrow a couple of army cots.

No modern tree hut is complete without a radio, so install an aerial and a ground. A good ground will serve also as a lightning rod.

Tree huts are reached by extension ladders, rope ladders, ladders made by nailing cleats to the tree trunk, and by a combination of these. Usually the lower length is made removable, and pulled up out of reach to make the hut inaccessible.

To gain entrance to the willow-tree hut shown in the photograph, one first climbs into the crotch of the tree, then up the branch on the right of the drawbridge. When all are in for the night, and the cat has been put out, the drawbridge is raised. Obviously, this is done to discourage airminded sleep walkers from descending in scanty attire.



Here is the floor framing plan for the drawbridge hut in the willow tree. Method of bracing provides solid support.

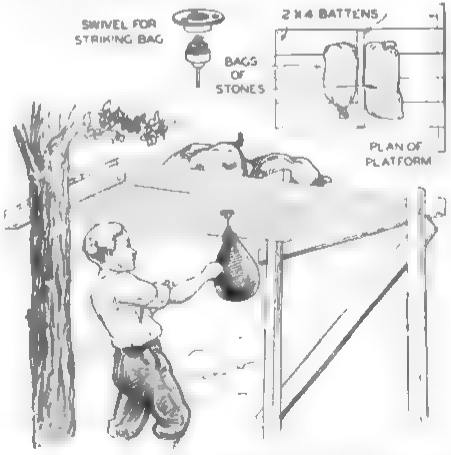
An accompanying diagram suggests how to frame the floor for a small two-tree hut. First, spike a pair of 2-by-4 blocks about 30 inches long to each tree (A, Fig. 2), on opposite sides, with the tops on a line with one another. Across the tops of these blocks rest two pieces of 2-by-6 (B), for floor girders, and spike them to the trees. And across the blocks near the bottom spike a 2-by-4 plate (C), one on each side of the trees. Cut separator block D (Figs. 2 and 3) to make a snug fit between 2-by-4s C, and spike it at the center of their length.

Girder B projects several inches beyond the trees, to support the end floor joists E. After cutting enough joists of the desired length, for a spacing of 16 inches or so, center them on the girders and spike them in place. Then spike the headers F to their ends. Cut struts G, next, with ends notched to fit over header F and plate G, as indicated in Fig. 3. The struts must be cut accurately to make a good piece of joinery. Tie the center struts with the 1-by-6 tie plate H. With the platform framed and braced, lay the flooring, then proceed with the construction of the hut.

With the substitution of heavier timbers, and the addition of struts, the same form of construction may be used for a larger platform.

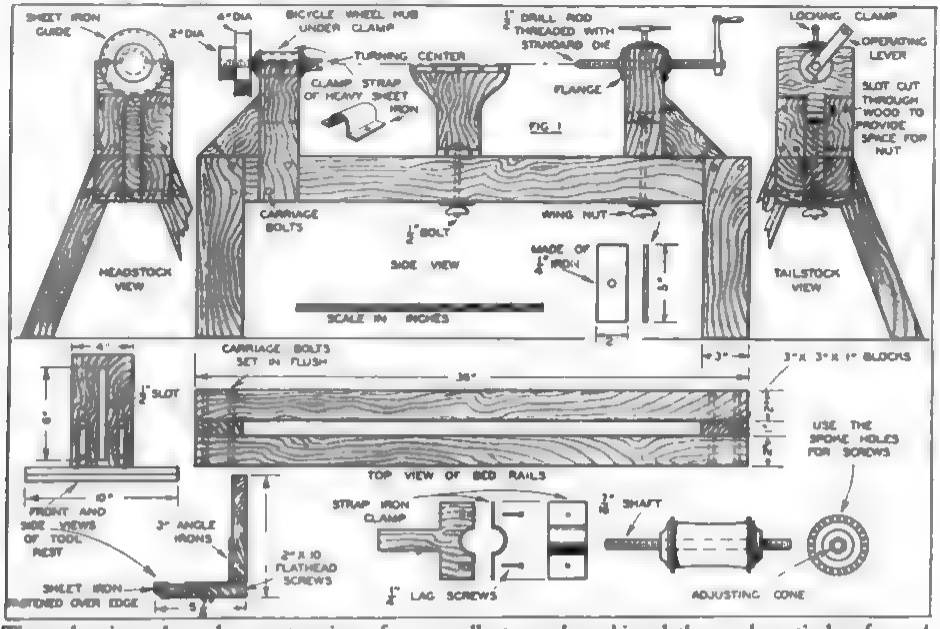
Outdoor Striking-Bag Platform

FOUR or five boards to make a platform about 30 by 60 inches in size, three pieces of 2-by-4 for battens, two more for supports, and a board for a brace, are sufficient material for this striking-bag platform. Frame the platform as shown in the plan. Spike one end batten to a tree trunk, the other to two uprights, and brace the uprights with a diagonal. If you haven't a swivel for your striking bar, a local sporting goods store or a mail-order house can supply it.



A punching bag platform built on the above lines will be a welcome addition to the outdoor sporting equipment of the summer camp.

Efficient Wood Turning Lathe Made From Bicycle Parts



These drawings show the construction of an excellent wood working lathe made entirely of wood, with the exception of the actual working parts. Details of assembly are explained in article below.

NO BRANCH of woodworking can equal the fascination of wood turning—the only reason that more home craftsmen do not become proficient in this art is that an efficient lathe is necessary and most machines of satisfactory type are rather expensive. It is not necessary, however, to purchase an elaborate lathe. The drawing above illustrates the construction of a home made lathe which can be built at a moderate cost.

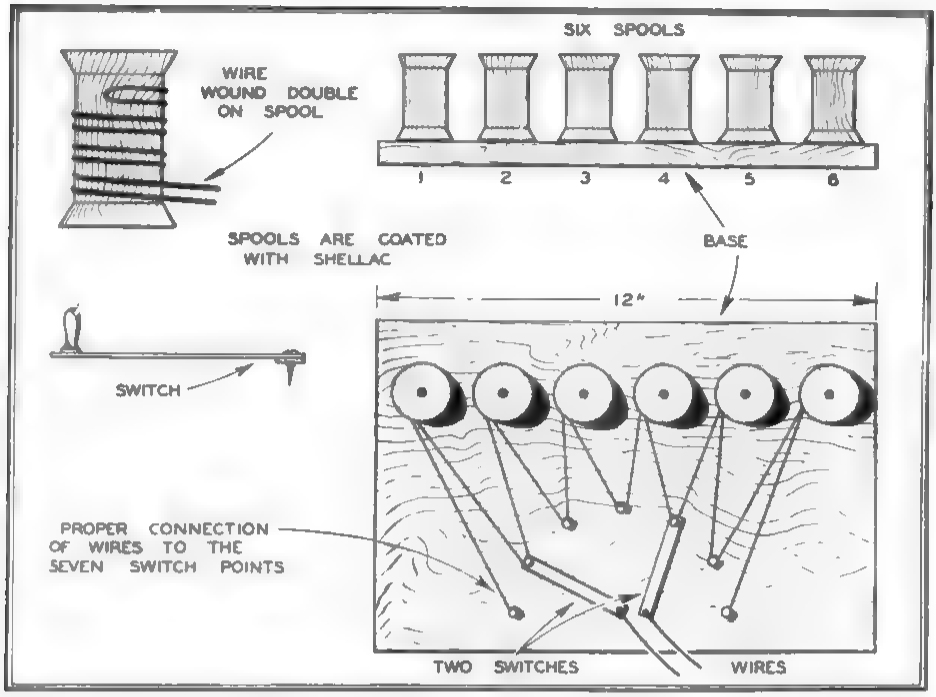
A glance at the drawings will show how the headstock is made from a large ball bearing bicycle hub (one from a motorcycle will be just as satisfactory). A heavy sheet iron clamp, held down by two screws, secures the hub to the hollow top of the headstock wooden block. The two-step wooden pulley is made of maple and is screwed to one end of the threaded shaft, against the adjusting cone. A turning center is made up, preferably of metal, and screwed on the other end of the shaft. This makes an excellent form of headstock, as the bearings are adjustable and offer little friction. The unit is secured with two carriage bolts, which go through the bed rails as well as the tenon of the headstock. Angle blocks are screwed to both and assist in bracing.

Construction of Tailstock

The tailstock is constructed of a wooden section similar to the headstock, using two iron flanges fastened with screws, one on each side. A steel rod is threaded to conform with the flanges. The working end of the rod has a pointed tip, and the other end is fitted with a handle for turning. The spindle is secured by making an oblong slot in the top down to the spindle; a square nut of the same thread is then sawed in two with a hacksaw. One half is dropped in the slot, a flange screwed over it, and a cap screw with a piece of short rod is used to tighten against the half nut, holding the spindle in any desired position. This unit is made movable by means of a bolt and wing nut, clamping on an iron plate.

For material use dry white maple or birch. In clamping make sure to tighten every nut securely, to prevent undue vibration. When assembled, the lathe is secured to a bench, and with a ¼-h. p. motor and a short belt is ready for use.

Wired Spools Make Speed Controller for Electric Toys

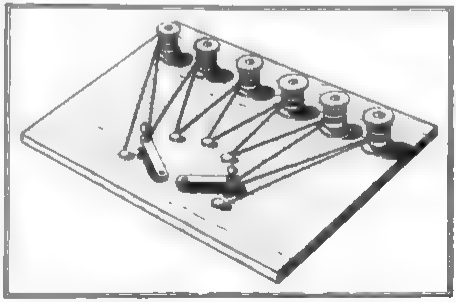


A SIMPLE speed control for electric toys can be made from six spools and a bit of wire as shown in the above diagram. The controller is designed for use with a battery, not with a transformer from the house lighting circuit.

First secure six wooden spools of the same size and shellac them. Just before the shellac dries wind around each spool lengths of No. 30 cotton covered wire as follows: On spool 1, wind 9 ft. of wire; spool 2, 19 ft.; spool 3, 19 ft.; spool 4, 48 ft.; spool 5, 48 ft.; spool 6, 98 ft. Wind double as shown so that the loose ends will both come at the same side of the spool. Place waxed paper between different layers of wires where necessary. Then allow shellac to dry and dip the spools in hot paraffin to cover the windings.

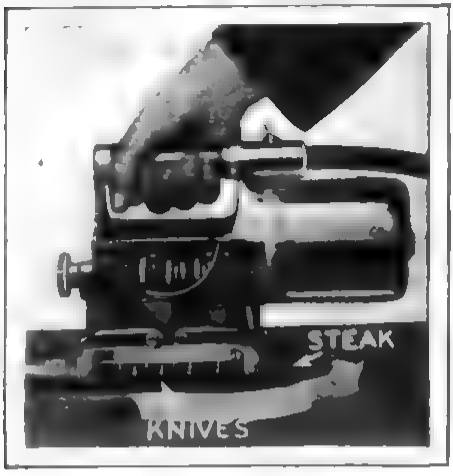
Shape a baseboard 1 ft. long and bore 6 holes 1¾ in. apart for the spool mounting. Arrange the spools in the order shown, fastening them with wooden meat skewers driven through the spools into the base. Drive 7 brass tacks in an arc at one end of the base and connect the wires from the coils as indicated. Then pivot two stiff brass strips near the tacks to act as switch arms and wire them to the battery and toy. Raise the pivot screw of one strip by a leather washer so that it will pass over the other strip without touching.

When connected as described the amount of current fed to the machines can be varied at will by moving the switch arms to various tack heads, thus varying the resistance in the wires as represented by the windings on the various spools. The controller should not cost over 25 cents.



This view of the completed controller shows clearly how the simple wiring is accomplished.

An Electric Cutter Makes Round Steak Taste Like T-Bone



STEAK that almost melts in your mouth can be had at every meal, if so desired, at inexpensive cost. Use of this electric meat tenderer, shown at left, makes round steak taste like the juiciest T-bone. About the same as a large flat iron in size and application, a number of staggered knives are mounted centrifugally on a fast revolving shaft.

They cut the sinew and fiber of the meat in all directions. There is no tearing or chopping action so that juice is lost in the process. Neither are there any marks on the meat after it is cooked. It appears exactly the same as an ordinarily prepared piece of steak.

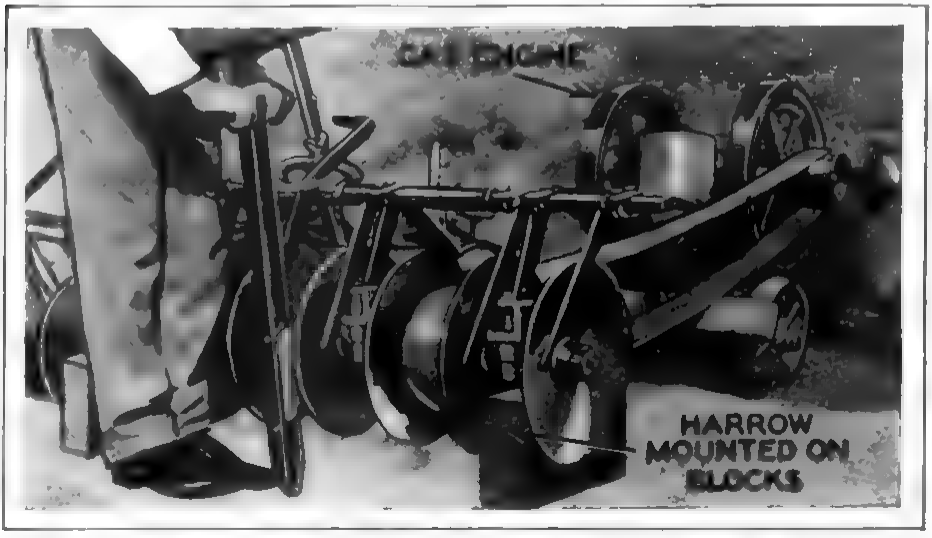
A switch on the handle of the cutter operates the knives. A small electric motor furnishes the power.

Simple Method of Sharpening Harrow Discs Keeps Them in Condition

SHARPENING the discs of a harrow for field cultivation is made an easy task by use of this simple device shown below. The harrow is mounted on blocks as shown and power is derived from a small gasoline motor hooked up in the rear.

The sharpener, fastened securely in a steel frame, is then placed against a revolving disc until the blade is sufficiently sharp to break up the heavy clods of earth in a plowed field. When one disc has been ground, the frame is moved to the next one in line until the whole row is equally sharp.

A heavy belt is attached from the harrow to the motor and revolves the discs at a rapid rate of speed so that when the grindstone is applied they are sharpened with a few turns. Harrow equipment about a farm may be kept in perfect condition by using this sharpener.



A flat-surfaced grindstone mounted in a steel frame easily sharpens the circular blades of harrow.

Beautiful Violin Made of Thousands of Pieces of Wood

EXACTLY 2,281 different blocks of wood comprise the violin shown at right. It was glued and pieced together after six months' work by Daniel Imhoff of St. Paul, Minnesota.

The tiny pieces are of maple, red cedar and walnut. Their natural colors and grains afford the instrument a beautiful finish.

The only tools the builder used in fashioning the violin from rough wood consisted of a jackknife, a scraper and varied grades of sandpaper.

One of the most difficult tasks of a violin-maker is that of constructing the sound box so that proper resonance of sound will provide a good tone. Mr. Imhoff has accomplished this, and the delicate instrument is a delight to the touch of a real musician. It gives forth an excellent tone.

Different colored blocks of violin form a design.

Speed Up—Oil Up—Light Up

EVERY Ford car owner—and there are many of them—will appreciate having choke, an oil gauge and match box holder on the driving side of the car where they can be reached without trouble. This attachment, shown below, is easily installed and improves the appearance of the interior of a car as well as doing its three prescribed duties efficiently.

It is black duco with nickel trim and is unusually attractive. Attached to the steering wheel shaft and connected to the motor and carburetor, it is constantly before the driver's eyes and within easy reach.

The gauge that was selected for this apparatus insures accuracy of registration.

Choke made of piano wire, encased in same metal.

Airport's Location Important

THAT location of an airport in relation to the city it serves is a factor of great importance in the future of aviation was the statement of Col. Charles A. Lindbergh to a joint congressional committee that is studying the needs of the national capital in this respect.

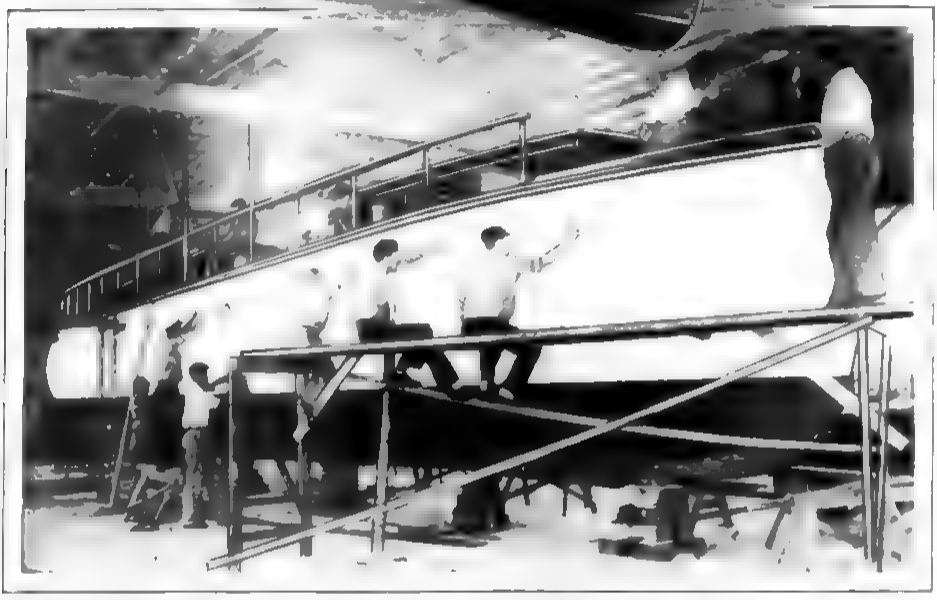
He pointed out that if it took an hour or so to go to the field from the central part of the city, advantage of speed of air travel would be greatly reduced.

Col. Lindbergh believes that in the future one airport will not be enough for a city. Development of aviation, he said, is growing so rapidly that several fields will be an absolute necessity. Great increase in flying is being made daily with the formation of aviation clubs and societies. Even "grandma" is getting the urge to fly, he said.

Most activity in commercial transport at present, Col. Lindbergh said, is on the Pacific coast. He attributed this in part to the climate and in part to the fund given to the transport line that showed the greatest necessity for a loan to help its operation.

CHOOSING Your JOB

NO. IV — The Boat Designer and Builder



The photo above shows the type of boat which requires specialized training to design. It is a hydroplane, capable of carrying torpedoes at high speed. Below, boys from the Miami high school boatbuilding classes are working on a fifty footer.

THE occupation of boat designer and builder is an alluring calling. The traditions of the sea, of ships, of things that float, are rich, and the spell they cast about one is said to be like that of printer's ink. There is a saying among printers that "once you get printer's ink on your hands you'll never get it off." Boats weave a similar spell about those who love them.

For that reason, journeymen boatbuilders, like journeymen printers, are numerous, and the field is well supplied with craftsmen of indifferent ability, although good men are always in demand.

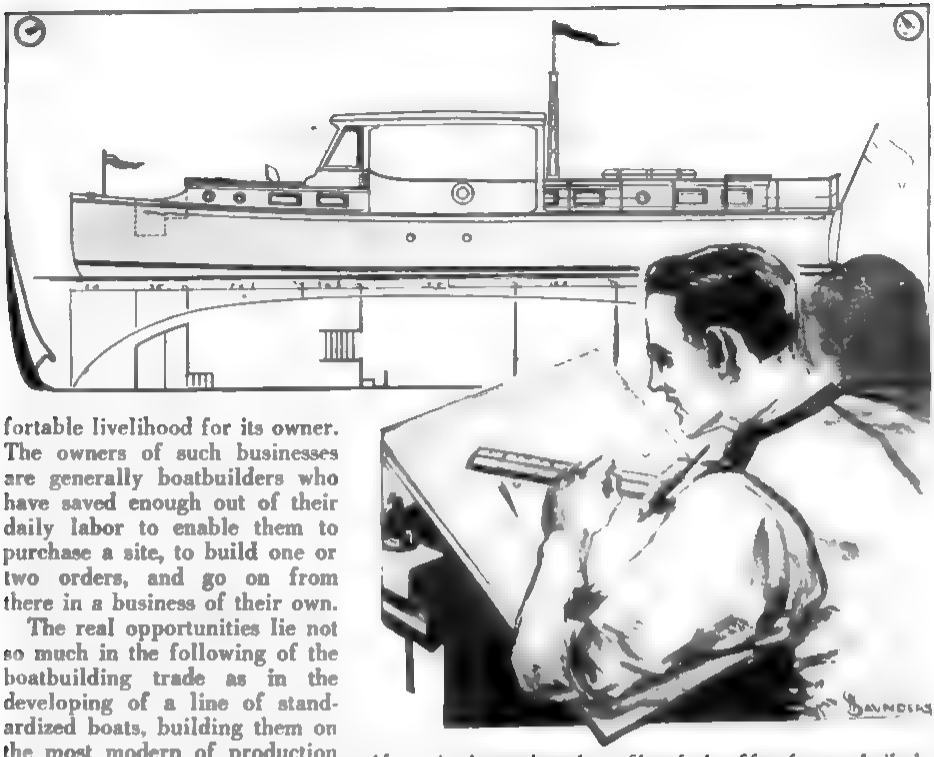
We are supposing in writing this, however, that the young man who reads this will set the top of the field as his mark. How high can one go in the field? What is the nature of the work? What may be accomplished in this "game"?

Let us first define our field. Shipbuilding, the fabricating of large steel vessels, is not considered in this writing. It is largely cut-and-dried engineering. Ships are built to standardized classifications and the only remaining application of naval architecture which allows of scope for originality in designing lies in the building of yachts, workboats, and smaller craft.

In this field opportunities for the right man are unlimited. It is entirely a question of what the man has to offer.

Nearly every watering place supports a boatbuilding business which earns a com-

by **WESTON FARMER**, *Naval Architect*



Above is the outboard profile of the fifty footers built by Miami high school boys, and for which several more orders were received. Such craft, to be excellent performers, should be laid out by a boat designer.

fortable livelihood for its owner. The owners of such businesses are generally boatbuilders who have saved enough out of their daily labor to enable them to purchase a site, to build one or two orders, and go on from there in a business of their own.

The real opportunities lie not so much in the following of the boatbuilding trade as in the developing of a line of standardized boats, building them on the most modern of production schedules, and then *selling* them.

Today the big field for development in the boat building industry is along manufacturing lines, production, cost-finding and sales having their usual relative functions.

There are many shops which are turning out a comfortable volume of business, furnishing pleasant, steady livelihoods for the men who own them. There are fewer shops systematically organized doing business on modern lines. The bigger opportunities lie in that direction, and are, as with anything that can be sold, limited only by the selling ability of the organization.

The average small lake or river side boat shop will furnish work for about three men and do from ten to fifteen thousand dollars a year volume of business. The margin of profit is slight and generally is no more than enough to give the laborers involved in the work a good living wage.

There are shops which have been visited by Efficiency, Management and Salesmanship which have cultivated a surprising volume of business from the same opportunities which gave their former operators bare livings.

At Peshtigo, Wisconsin, there is a boatbuilding company which has injected production methods and modern selling methods into their organization to the extent that last year 5,000 separate boats were built and sold all over the world. This volume must have run to $500,000, out of which good profits could easily have been taken.

In the boatbuilding business, as in other lines, *profits are what you can make them.*

The foregoing covers the trends in the business today.

Boatbuilding companies are borrowing from automobile practice as much as they can. Future success will pour most richly

Master Boatbuilder T. F. Angerman of the Miami high school boatshop shows Supt. Hiley the model for the fifty footer turned out by the pupils. The shop, modern, well lighted, ample for years to come is 175 by 45 feet and cost $20,000. Here high school students "learn the trade."

into the lap of the man who best coordinates the building, the selling, and the management of his plant.

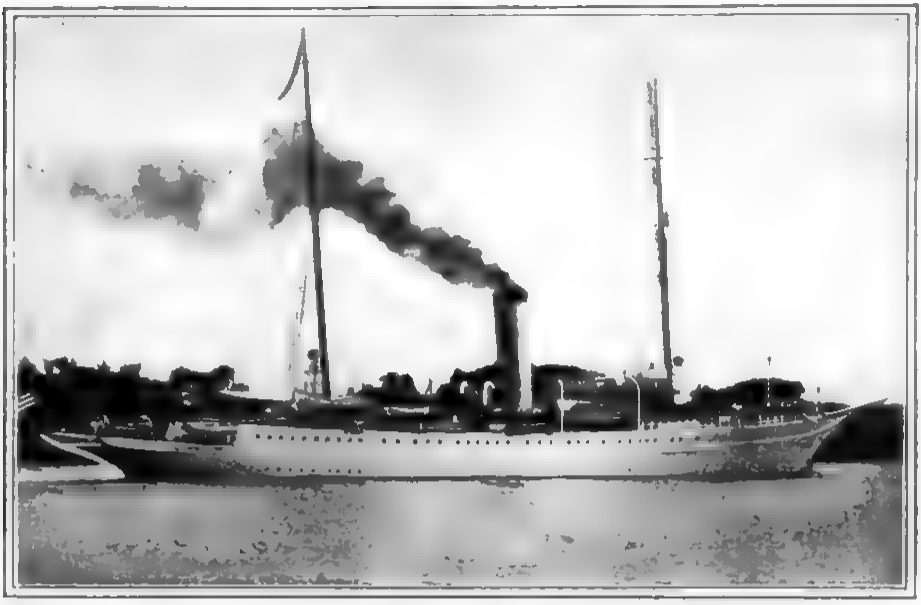
But you are asking, "What is the best way for me to get into the boatbuilding game? And what about boat designers? Do they make much money?"

Ah! I was about to speak of that.

You see, the boatbuilding industry depends upon two types of craftsmen, in the main. These are the boatbuilder-laborer, and the designer. These are the men who fabricate what the public wants. They do the labor of putting the wood together and predetermining what the boat will look like.

Boatbuilders are considered just so much skilled help by the owners of shops. The wages paid vary from 50 cents an hour to $1.00 an hour, depending upon locality. The trade as such has little more to offer than bricklaying, plumbing, or any other line of labor. It is pleasant work with a certain fascination, which has already been likened to that which the printer feels toward his craft. Foremanship and possibly the ownership of a shop are open to a man who is unusually skilled in the exacting woodworking which boatbuilding requires, but such a man rarely has the business training to make the most of his opportunities in a business way.

The boat designer is a man of different cast. He must be technically trained to know his work to the best advantage. He designs the boats his yard builds, and in some cases is popular enough, his work in enough of a demand, so that he can rent an office and design boats for the public at large. In such case he is called a Naval Architect. His fees usually are from 5% of what a large yacht costs to 10% of what a small one costs, and he more than saves the builder and owner that sum through his superior knowledge of boats and yachts. His fees run from $25, or even less, for a set of stock plans, up to $50,000



The president's yacht, Mayflower. An example of the work of a naval architect. Many such palatial pleasure vessels are building in America at present, and architects' fees in each case amount to about 5% of the total cost of over half a million dollars. Such vessels are beyond the scope of the average boatyard.

for unusually large yachts. There are perhaps twenty boats building in the country at the present time, products of naval architects, which will cost better than $500,000 each. These are for millionaire yachtsmen and sportsmen.

Boatbuilders are relatively plentiful; boat designers are few and far between, and they have a ready market for their work. The boat builder makes between $1,500 to $2,000 a year; the Naval Architect can make from $3,000 upwards. A good average would be $5,000 a year.

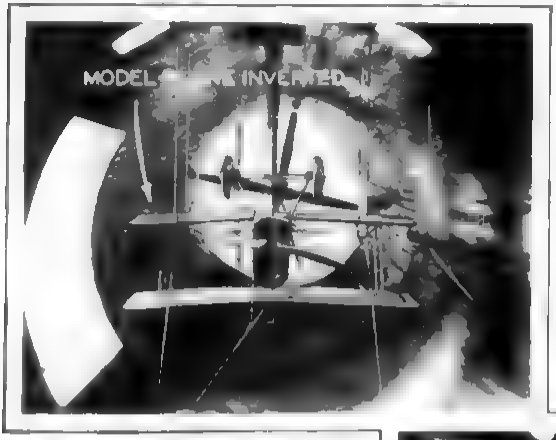
The best way to get into the boatbuilding industry is through either of these two channels: Take up the tools and learn the trade, thus working into the business in logically succeeding steps, or understudy some designer and learn his trade.

The designer of course should be a good boatbuilder. There are a few men who have learned the designing end of the business who have never been boatbuilders, and their work shows it. They draw beautifully, but boatbuilders have difficulty in

(Continued on page 170)

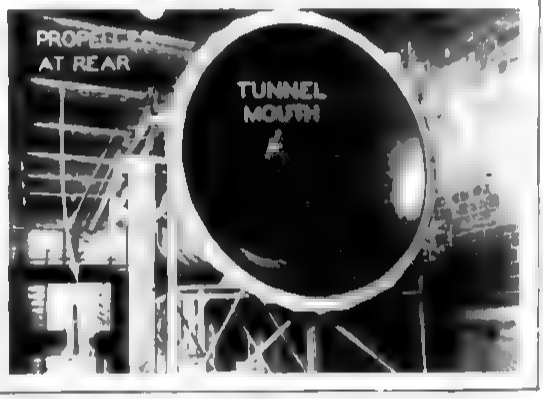
An example of the boatbuilder's art. This shows a star class sailboat under way at Los Angeles.

Scale Model Planes Tested in Artificial Ninety Mile Wind



BLOWING at a rate of 90 m.p.h., an artificial gale, created by a 14-foot propeller, is used for testing model planes in the Daniel Guggenheim Aeronautical Laboratories, Boston, Mass.

The wind whistles through a huge tunnel designed especially for this purpose. View of the interior is shown at left. A scale model airplane suspended upside-down for test purposes is maneuvered through the tunnel by means of light wires. Delicate instruments record the flight characteristics in the rush of air.



This wind-tunnel shown above and at right measures 81 feet in length, seven feet in diameter and 15 feet at the ends. The propeller at the rear is powered by an electric motor.

Operate Watch by Radio

DEVELOPMENT of a watch that will be regulated by radio is being attempted by a large American watch manufacturer, according to Louis G. Caldwell, former general counsel of the radio commission. Mr. Caldwell was recently a witness at a hearing on this subject before the senate inter-state commerce committee. Such a watch will be controlled by radio broadcast so that users will have the correct time.

System to Eliminate Usher

THEATER ushers may go the way of the mustache cups and bustles, if the invention of a Cincinnati man is generally adopted. Consisting of a panel which would display, by well illuminated numerals, the location of vacant seats in a theater, the invention was devised by Albert C. Carter. The panel would be set up in the foyer of a theater, and as a seat is occupied or vacated, corresponding lights would turn off or on automatically.

To eliminate groping about in the darkness, small lights in the aisle at the end of each row of seats would indicate those unoccupied.

Used Ducking Stools for Wives

"JAN. 7th, the year of our Lord, 1636—Paid the porters 2 shillings, 0 pence for ducking Goodwife Redham." So reads a typical entry in an old Kentish book of records. A ducking stool for immersing scolding and nagging wives in the River Stour near Canterbury is one of the many relics of the past still to be seen by those who wander on the beaten tourist paths there.

The stool, which hangs by a block and tackle from a beam that projects over the river at Fordwich, is no longer used, although it can still be worked. Inside the town hall nearby there is a dressing room where soaking but reformed shrews could change before going home to prove how seriously they meant their promises.

Easy to Keep Shrubbery Trimmed With Novel Cutter

WORKING on the same principle as an electric hair clipper, this new shrubbery trimmer shown in operation in the photo at right cuts uneven bushes and shrubs in desired shapes and forms with a single trimming.

It is electrically powered. A small motor operating the clippers is a part of the back of the "comb." The trimmer is controlled by means of a push-button on the handle.

The length of the handle measures four feet, allowing it to reach high shrubs without the necessity of the operator using a ladder or something else to stand on.

Sharp teeth of the cutter clip tough twigs and stems smoothly, evenly and effortlessly.

Practical Clothes Hanger Arm

TO PROTECT clothes from becoming wrinkled and out of shape while stored in a closet, this device shown below was developed to hang coats, trousers and dress frames on.

It consists merely of a metal arm projecting from an ordinary clothes closet hook. Five holes, adequately spaced so that there will be plenty of room between hangers, are provided for in the arm. It is clamped firmly to the hook and will not slip off with the added weight of loaded hangers.

A right-angled base fits flat against the surface of the wall underneath the hook.

A small chain holds hanger arm tightly to hook.

Pays Penalty for Capers in Air

PRIVATE F. F. FIETZ, U. S. Army student pilot at Brooks field, San Antonio, Texas, was shorn of his wings and court-martial charges brought against him as a result of a too zealous ambition to fly.

Without authority from his superior officers, Private Fietz, lacking pilot's rating, took a plane up for an airing recently. Zooming low over house-tops, cutting circles around chimneys and even arguing the right of way with motorists, Fietz frightened the residents of Highland Park, a suburb, to the extent that phone calls were continuous at the nearest police station while he was in the air.

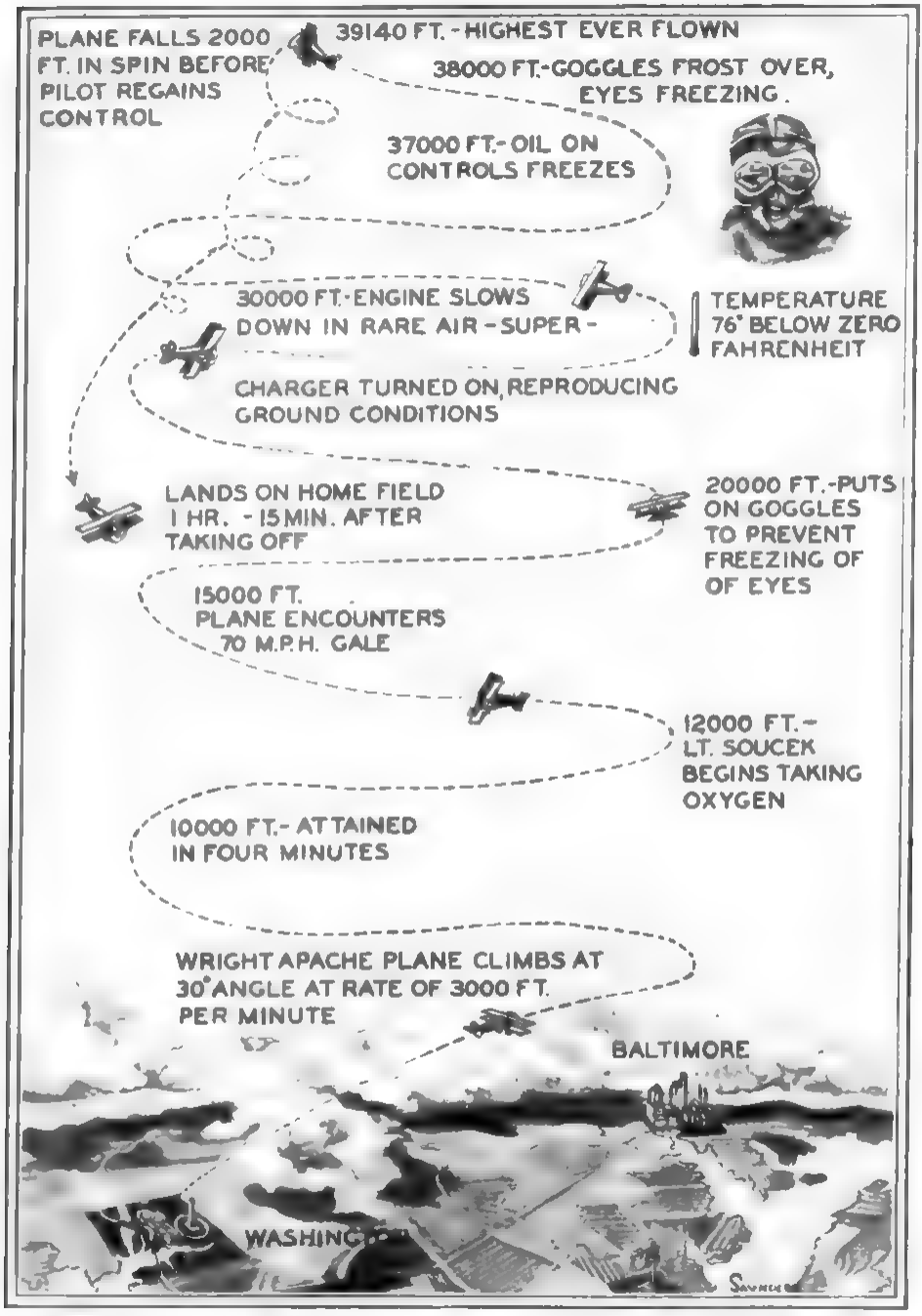
One motorist was reported to have wrecked his car in an attempt to dodge the diving plane.

After the police had received about 100 telephone calls from frenzied citizens complaining of the acrobatic flying, half a dozen ships took off from Brooks field in war formation.

They returned a few minutes later after having surrounded Private Fietz. He made a perfect landing. The culprit was immediately placed under arrest by Major S. W. Fitzgerald, commander of the field.

Fietz said that mere study of engines had bored him and that he had longed for freedom of the air and the roar of an open exhaust. He got it, but at an expensive price. Just such "crazy" performances as this exemplify the reason why such high standards in the qualifying of a licensed pilot are set.

Drawing Shows How Lieut. Apollo Soucek Set World's Altitude Record



Lieut. Soucek reached a height of 7½ miles to better the previous altitude record by 722 feet.

7½ Miles Straight Up!

Flying 39,140 feet above the earth—nearly seven and a half miles—Lieut. Apollo Soucek of the U. S. Navy sets new world's record.

AT 11:10 o'clock on the morning of May 8, a Wright Apache airplane piloted by Lieut. Apollo Soucek of the United States Navy, took off from Anacostia field in the District of Columbia and climbed up into the blue sky at a rate of 3,000 feet per minute. In a few minutes the plane was entirely lost to view from observers on the ground. One hour and 15 minutes later Lieut. Soucek brought his plane down again on the Anacostia field, bringing with him the two barographs the plane had carried which, when checked, told the story that he had flown to a height of 39,140 feet above the earth—higher than any man had ever flown before.

Lieut. Soucek himself had another story to tell—the story of how he encountered a 70 m. p. h. gale 15,000 feet above the earth; how his eyes nearly froze in the terrific cold of 76 degrees below zero; how the oil on his controls froze, making it almost impossible to guide the plane; how he became dizzy at the height of his flight and lost control of his plane, falling 2,000 feet in a spin before he righted it. The step-by-step story of Lieut. Soucek's great flight is presented in the drawing on page 122.

Above Lieut. Soucek is shown just after landing from his record breaking flight, standing in front of the propeller of his plane. At the left Lieut. Soucek is encased in the special helmet which protected him from the severe cold.

The Wright Apache plane in which Lieut. Soucek set the altitude record is shown above. It is the same plane in which the previous holder of the record, Lieut. C. C. Champion, set his mark. A Wasp engine is used. Note the large wing area of the plane, necessary to lift it to high altitudes.

This Novel Barber Chair Keeps Attention of Youngsters

CHILDREN who have an aversion to getting their hair cut, rapidly overcome it when they see the special chairs that have been installed in a barber shop in Bisbee, Arizona.

The chairs are turned easily and there are plenty of objects and levers to keep the child's attention while the barber is clipping his hair.

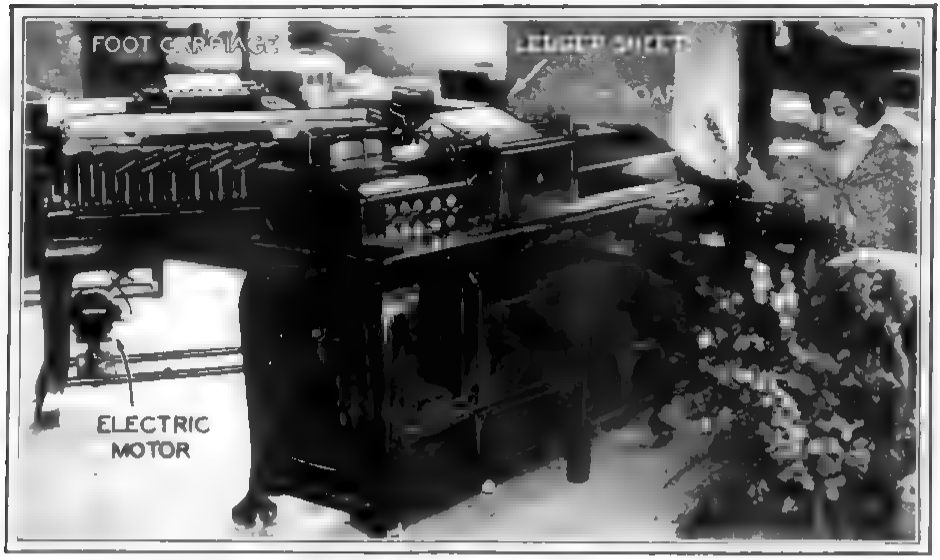
Modeled after toy automobiles, ponies and boats, the children's chairs not only attract juvenile attention and allow the barber to cut a youngster's hair without his wanting to get out and roam all around the shop, but grown-up customers often get the urge to climb into one of the chairs for their trim.

Traveling Electric Light Plant Aids San Francisco Fire-Fighters

GENERATING a 10-kilowatt electric current, this traveling electric light plant shown below is the latest aid to San Francisco firemen. It provides enough current to efficiently operate five 1,000 watt searchlights, mounted on top of the truck. They can be turned in any direction and are of valuable use in night fires breaking out in tall buildings. Eight portable 400 watt lights are also carried in the truck. Each is connected with 500 feet of cable and attached to stands for setting up inside a building. The total weight of the truck is 12,500 pounds. All of the fittings are waterproof to insure against short-circuiting. The plant is said to be the only one in existence. It was designed by Sam Birmingham, superintendent of the corporation yard of the Board of Public Works of San Francisco.

Powerful lights of this traveling plant are operated from a switch board on the side of the truck.

Mechanical Brains Take Over Work of Ten Office Clerks



A REGULAR ration of electric current, with occasional dessert of a little oil now and then, is all that this tabulating machine, shown above, requires to do the work of ten persons. A combination bookkeeper, adding machine, card sorter, cash register and computator all in one, the machine is operated by three people. Depending on which button is pushed, it can turn out complete report sheets of figures, budget reports, sales analysis, statements of labor costs or payroll listings. The apparatus has recently been installed in the bureau of light and power in the city of Los Angeles. It weighs 3,000 pounds and is one of the two in existence. Miss Mildred Gorham is shown operating one unit of the machine. It runs silently.

Special Mask Guards the Face of this Bee Salesman

WEARING a special mask that is composed of a screen face and a heavy cloth material wrapped about the head, this bee salesman shown at right is protected from any of his "merchandise" who might take it into their heads to exercise their stingers on him.

He is employed in the largest bee market in Europe. It is held in Holland every year, and millions of bees are bought and sold during the season. Keepers and salesmen who handle the bees a great deal usually wear heavy gloves. This man has discarded his.

Edited by CHARLES MAGEE ADAMS

As one of the pioneers in the field of Radio, Charles Magee Adams is admirably qualified by training and experience to advise the readers of Modern Mechanics as to the best ways of getting satisfactory service from their receiving sets. This department is a regular monthly feature of the magazine.

This Simple Arrester Protects Receivers from Lightning

AS FAR as the danger from lightning is concerned, summer thunderstorms need not cause the radio fan any particular anxiety. The possibility of an aerial being struck is quite small. However, it is always worth while to protect an aerial and

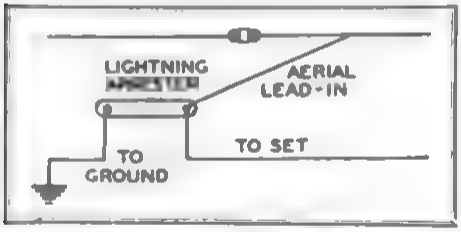


Fig. 1. Wiring diagram of the lightning arrester.

receiver against the possibility of being struck, the more so because the cost and trouble required are small compared with the price of a ruined receiver.

The device which provides this protection is a radio lightning arrester. A type approved by the board of fire underwriters should be obtained and mounted on the outside wall at the point where the aerial lead-in enters the house. The connections are shown in figure 1.

The ground for the arrester should not be the same as is used for the receiver. An iron pipe 6 or 8 feet long driven in the earth will answer nicely, or a zinc or copper plate buried 3 or 4 feet. The wire from this ground to the arrester should be No. 4 or larger and run as directly as possible.

Another aerial attachment of value during the summer is a 30 amp. single-pole double-throw knife switch connected as shown in figure 2. By studying the diagram it will be seen that when the switch is thrown to one side the aerial is connected to the receiver as usual; while when thrown to the other side it is connected directly to ground.

Such a switch provides a convenient defense against heavy summer static. When this interference is bad merely throw the switch to the ground side. It will then be found that by turning up the volume control on the receiver nearby stations can be brought in with practically no static.

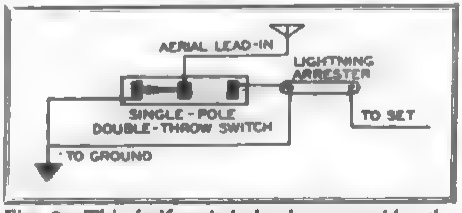
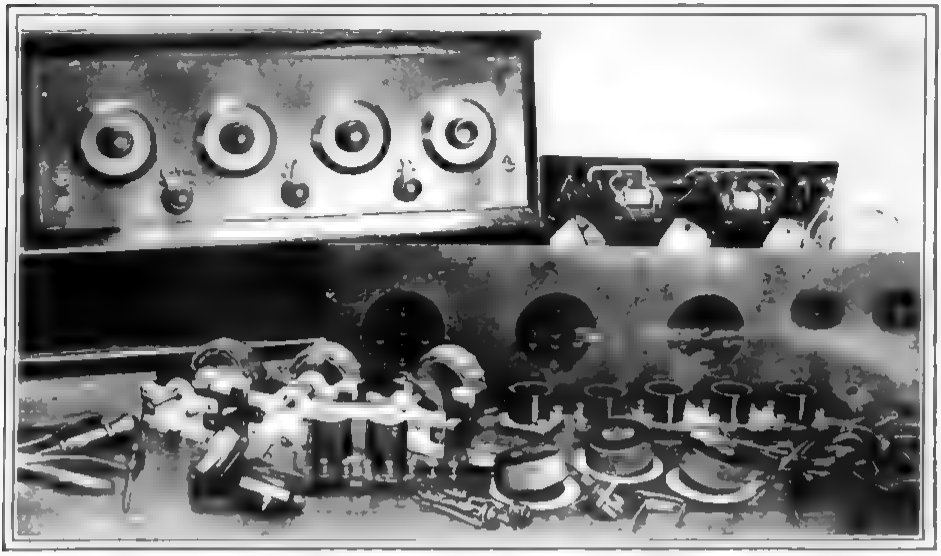


Fig. 2. This knife-switch hook-up provides the radio fan with a convenient defense against summer static.

Wrecked Receivers Make Good Source for Radio Parts



Disassembled parts shown in the foreground were all reclaimed from an old five-tube set. Various purposes to which they can be applied are explained below. Old sets can always be picked up cheaply.

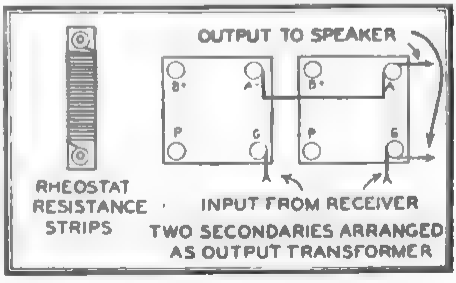
SINCE the advent of AC receivers thousands of battery operated sets have been thrown on the market or lay discarded in the attic. At present these can be purchased for next to nothing. Many of the oldest types of receivers contain the best of parts and they can be utilized in many ways in test circuits, the building of transmitting equipment, and even in the construction of portions of AC sets.

The photograph above shows what the writer gathered from the wrecking of just one old five-tube set. Two other receivers in the background were later wrecked for as much or more material as the first one yielded.

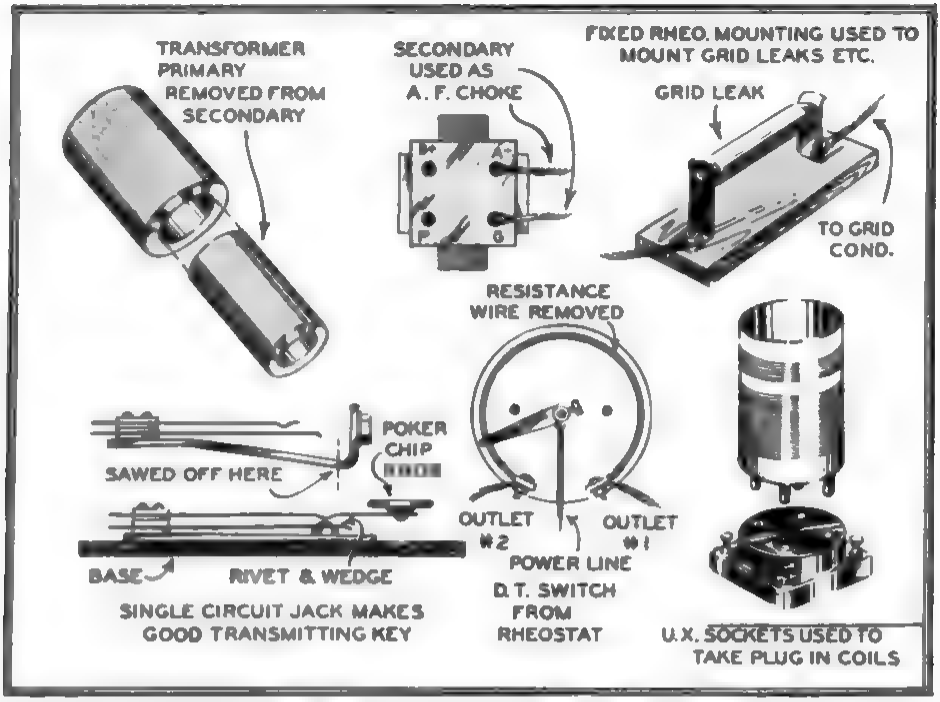
All the parts in good condition can, of course, be used "as is" in the building of other receivers or experimental hook-ups of various kinds. Transformers with burned-out primaries can also be used for special purposes. The secondaries can be hooked in transmitting circuits for audio chokes against a microphone modulator. Two such transformers with like ratios can be connected as shown in the diagram to act as an output transformer for receivers using power tubes and high voltage. The speaker input is connected to the grid posts and the two A-posts connected together. Then the terminals of the speaker cord are attached to the pair of A- and Grid posts as shown.

It is well nigh impossible for the constructor to rewind a transformer primary for audio use, but a microphone transformer for transmitting can be made by removing the old primary and winding one the same size of No. 28 or No. 30 enameled wire. This will give you about a 35 turn ratio and acts admirably for this purpose.

Variable condensers can be cut down to any suitable capacity by carefully removing the rotor and then taking out the necessary



A method of hooking up secondaries to act as an output transformer is diagrammed above.



A number of uses for old radio parts salvaged from discarded sets is pictured above. Any amateur will think of scores of other uses to which such parts may be put.

plates from both rotor and stator and reassembling.

Fixed rheostats can well be used as resistances for other purposes. If they are useless the mountings can be used for grid leak mountings where the leak and the condensers are in series.

A good two way switch can be made from an old variable rheostat. Most of the resistance is removed. Then the arm is connected to the power line and the posts connected to the two outlets for the current. In some cases the entire resistance unit can be removed on the fibre strip. By immersing the strip in hot water it will soften just enough so it can be flattened out and then used to shunt or put in series with meters to lower the readings. Two like resistances connected together make a good center-tapped resistance for various purposes.

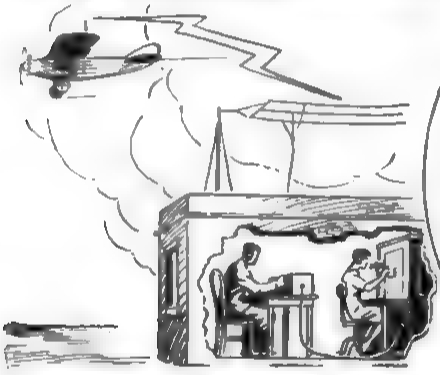
Old sockets, other than for tube purposes, can be used to take short wave plug in coils of home construction. Also for cable connectors, etc., made from old tube bases.

The fifty or sixty turn coils used as radio frequency and antenna coils can be well used in making wave meter pick-up coils. They can be cut down in turns for short wave coils or the wire can be entirely unwound from them and used for any suitable purpose.

Double circuit jacks can be made into single circuit ones by merely removing the two inside prongs. Single circuit jacks can be converted into a novel transmitting key as shown in the sketch. Simply saw off the vertical lug and drill a hole in the base for a screw. Then wedge under the lower prong and drill for a small screw. Solder on an extension to the top prong and fit with a poker chip for a knob. Separate the prongs so there is about one-eighth inch between the top prong bend and the screw below it. This makes a good key.

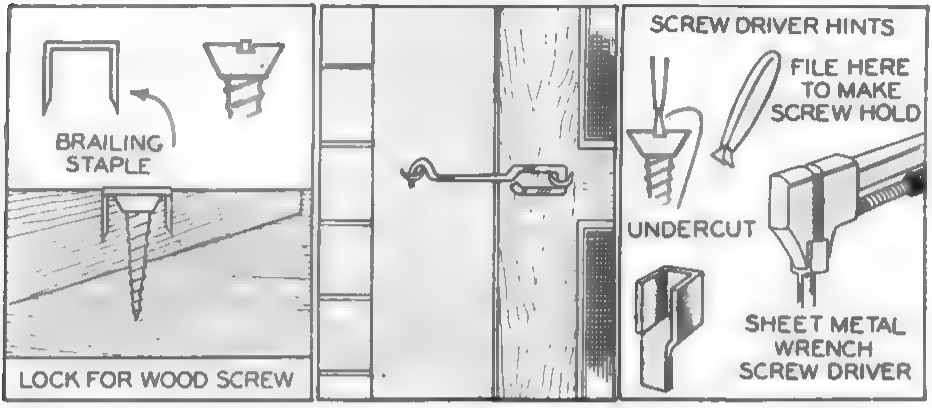
These are only a few of the uses to which parts from wrecked sets can be put. Amateurs everywhere will find many new and valuable uses, and it will be found that the cost of these parts is insignificant.

Talking to the Ground from an Airplane



Another milestone in the history of the airplane was passed recently when the first telephone conversation between a passenger in a flying plane and a listener on the ground was successfully carried out. The top photo shows the Fairchild plane flying over Whippany, N. J., where the tests were conducted. The pole extending upward from the wing is the antenna from which the conversation was broadcast to be picked up by a radio receiving set connected to a telephone switchboard, as shown in the drawing. The switchboard operator made the desired connections when the passenger in the plane reported the number he wanted. In the circle above, John O'Donnell is phoning from inside the fuselage of the plane. At right, a rewrite man on O'Donnell's newspaper is taking down his story.

Items to Interest the Home Mechanic



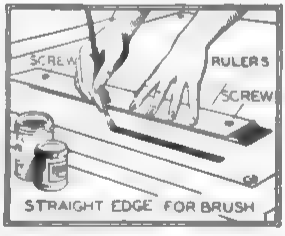
SEVERAL handy little shop kinks which will come in useful for almost any shop worker or householder are shown in the drawings above. The drawing at the left above illustrates a method of locking a wood screw in place which is well known to cabinet makers. In many kinds of furniture there are screws which are countersunk and plugged, and these frequently work loose. To lock a loose screw permanently in place, secure a square-headed staple such as is used with brailing wire and drive it into the wood over the screw so that its head occupies the slot in the screw top, anchoring it securely.

The center drawing shows how a button hook and two staples can be impressed into service as an emergency door latch for the summer cottage. Helpful to know when the screen door bangs in the breeze and you have no regular latch!

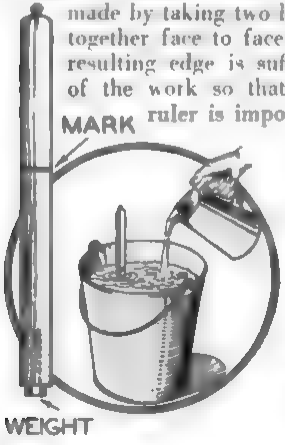
Anyone who uses a screwdriver frequently will appreciate the hints in the drawing at the right above. If you undercut the end of your screwdriver as shown, the tool will not jump out from the screw slot. A sheet metal attachment turned by the head of a wrench makes a handy device for removing deep set screws.

Rulers Screwed Together Make Good Straight Edge for a Paint Brush

IN PAINTING signs and showcards where a brush is used in laying the ink, a straight edge which will not smear or blur the finished work is essential. One can easily be made by taking two beveled rulers and screwing them together face to face as shown in the drawing. The resulting edge is sufficiently high above the surface of the work so that smearing of the paint by the ruler is impossible.

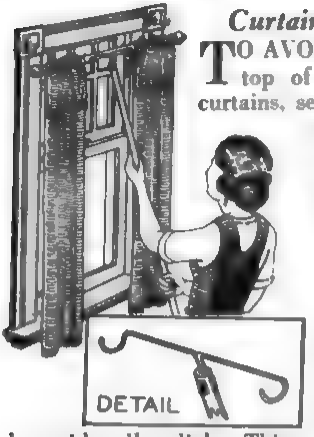


Home-Made Hydrometer



EVER HAVE an occasion to test the specific gravity of some liquid when you didn't have a hydrometer around your garage or workshop? One can easily be made from a broomstick with a little metal in one end to make it float in a vertical position. Suppose you wish to test a solution of alcohol and water as a radiator anti-freeze solution. Mix the two fluids in definite proportions, float the broomstick in the liquid, and mark the surface line on the stick. When mixing a solution again, pour water into the container and dilute with alcohol until the stick sinks to the surface mark.

Simple Devices You Will Find Useful



Curtain Rod Hanger Easily Made

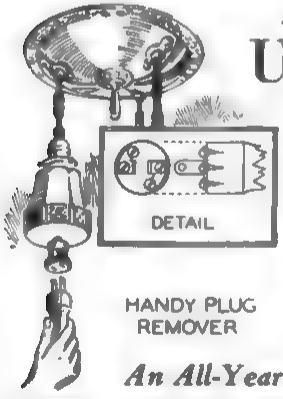
TO AVOID the necessity of working from the top of a step ladder in handling heavy curtains, secure a broomstick and insert in one end two pieces of copper or other metal tubing in the manner shown in the drawing. A 1/4-in. hole is bored into the end of the stick for a depth of four inches to receive the rods.

Phosphorus and Oil Furnish Illumination

AN INGENIOUS phosphorus light which can be used in places where, because of the presence of chemicals or other reasons, an open flame light would be dangerous, can be constructed by filling a bottle half way with olive oil and floating a lump of yellow phosphorus upon it. Admission of air to the bottle causes the phosphorus to glow with yellow light. This scheme could be used by fishermen to attract the finny tribe.

Uncle Sam Mail Box Is Neat Appearing

INSTEAD of the ordinary unsightly post upon which rural mail boxes are usually mounted, an attractive appearing figure of Uncle Sam can be substituted with little effort. A single stout board is all that is required. First sketch out the outlines of the figure directly on the board, checking the height of the arm to make sure that the boxes will be located at a convenient level. Leave a length of at least a foot beneath the shoe for mounting the board in the ground. Saw around the figure and paint it appropriately in red, white and blue. The boxes should be mounted on Uncle Sam's outstretched arm.



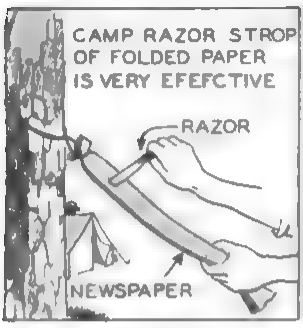
Extension Plug Remover

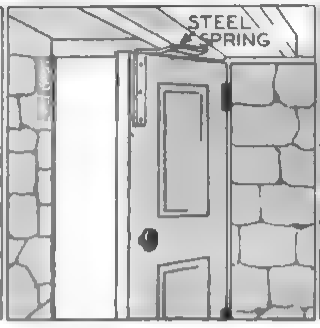
USUALLY electric light fixtures are located just far enough out of reach so that it requires a bit of stretching to reach up and unscrew the plug of the electric toaster from a ceiling fixture. To avoid this, take a short length of broomstick, cut it off to a square end, and screw into it two brass slugs salvaged from a discarded plug. Be sure to space them the proper distance apart to insure a good fit. The length of the handle should be adjusted to individual reach. To remove a plug, simply insert the brass pieces into their sockets and the plug can be conveniently unscrewed by the extension handle.

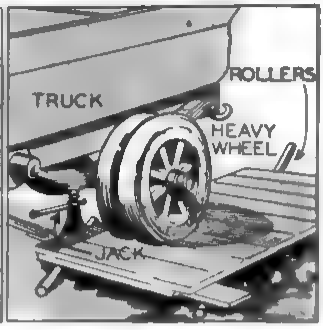
An All-Year Bird Station for Thirty Cents

THIS simple little bird station can be constructed from the end of a packing box mounted upon a tree stump or post. During the summer a granite pan, 2 1/2 inches deep and 12 inches in diameter, is filled with water and kept in the tray to serve as a bird bath. During the winter the pan is removed and a 6-inch circular chick feeder, filled with suet, occupies one corner of the tray. Cost of pan and feeder does not exceed 30 cents.

Easy Ways of Doing Common Jobs







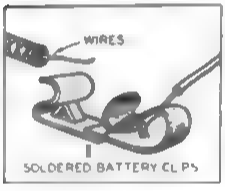
NEXT TIME when you go camping and forget to take your razor strop along, don't resign yourself to shaving with a dull blade. There will always be an old newspaper around the camp, and when this is folded after the manner of an accordion it will serve admirably to give an edge to a razor. Tie the folded paper together at one end and mount it to a tree or post and you will have a good emergency strop.

A convenient door check for a frame cabin can be made by mounting a piece of spring steel on top of the door as shown so that the free end will be in contact with a ceiling beam, serving to hold the door open so that it will not swing in the wind.

Did you ever have the job of mounting a heavy wheel on a truck? It's a man sized job. The method pictured at the right above will be welcomed by drivers. The wheel is placed on a wooden support which is moved into position on rollers.

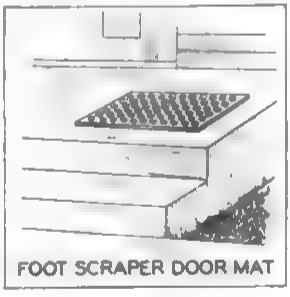
Temporary Wire Connector

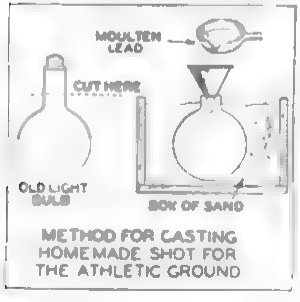
TO MAKE temporary connections in electrical work, take a pair of ordinary clip connectors and solder them together at their base. The wires can then easily be attached and removed, with no chance of the connection loosening.



Bottle Caps Make Good Foot Scraper

CRIMPED caps which come on the tops of beverage bottles can be employed for a useful purpose to make a foot scraper. Take a wooden or composition base of the desired size and tack a number of upended caps to it, as shown in the drawing at the right. The crimped edges will present a surface which will remove the most hard-caked mud from shoes. If the mat is small, it had best be anchored to the porch floor, but if it is of average size it will lie flat without tacking.





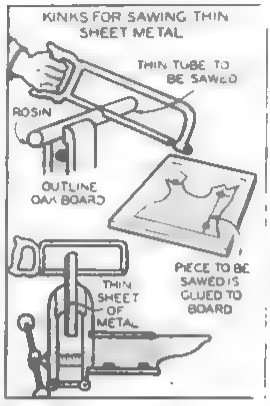
Casting Shot With an Old Light Bulb

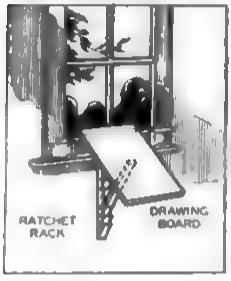
AN EASY method of casting shot for athletic use is pictured in the diagram at the left. Secure an old electric light bulb with a round globe, and cut it off as indicated by tying a string around the neck and burning it, dipping quickly in cold water. The string should be soaked in gasoline so that it will burn hotly. Then insert the globe in a casting box and surround it with sand, after which it is a simple task to pour molten lead into the globe, which will shape it into a perfect sphere.

Handy Items for the Home Workshop

Resin-Filled Metal Tubing Easily Sawed

THE MOST satisfactory method of sawing a tube of thin metal is to fill it with resin and cut it with an ordinary hacksaw. The resin is sufficiently hard to keep the tube from fraying where the end is cut, and solid enough to hold the metal securely for boring holes through the sides. When the operations are completed the resin can be removed by heating. Another handy shortcut in the filing and cutting of sheet metal edges consists in mounting the metal between two thin hard pieces of wood and sawing to the desired pattern with jig saw or hacksaw. Use casein glue: water will loosen it after use.



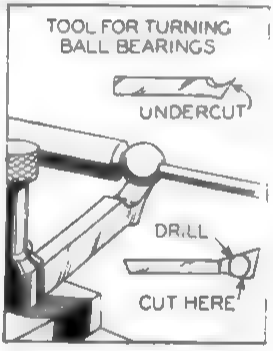


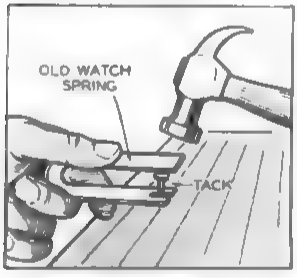
Handy Drawing Board Mount

A CONVENIENT arrangement for a drawing board which always insures a good working light is shown in the drawing at the left. On the scarpments of the window screw two wooden blocks notched to hold a broomstick. Under the board fasten another length of broomstick to fit over the first. Attach a piece of 1x2 lumber beneath the center of the board, on a hinge, and with the addition of a ratchet rack your job is done.

New Tool for Making Small Ball Bearings

FOR cutting small metal spheres such as are used for ball bearings, throttle handle heads, and similar purposes, the novel tool shown in the drawing herewith will serve well. Take a piece of high speed tool steel and flatten the lip. Drill the lip the exact diameter you wish the ball to be, cut apart as indicated, undercut the edge and sharpen, and the tool will be ready for use.





Old Watch Spring Makes Good Tack Holder

A CONVENIENT holder for driving tacks can be made from an old alarm clock spring. Anneal the spring by heating and then cooling slowly in a dish of salt. This will take the temper out of it and you can work it easily. Bend as shown and file a claw to hold the tack. The spring can be re-tempered by heating and plunging it in cold water.

Lens Removing Tool

IN REPLACING a burned out bulb in an auto headlight, the lens frame must be removed. Sometimes this is a difficult task, especially if the retaining springs of the frame have rusted. The most stubborn frame may be started without injury by use of the device illustrated in the drawing. This consists of a wooden handle about 2½ feet long, to one end of which has been nailed a piece of leather strap or cotton webbing 2 inches wide and slightly longer than the circumference of the frame to be loosened.

A PORTABLE COMPOST SCREEN

By HI SIBLEY

Not only for screening sand for mixing concrete or sifting garden soil but for countless other uses as well, the portable compost screen will be found an invaluable addition to the household tool chest.

A LIGHT, portable screen for sifting soil is indispensable where any considerable amount of gardening is done. Even in the writer's small city lot the original of the portable screen diagrammed in the drawing herewith is in almost daily use. Besides its service as a screen the device is handy for carting leaves, lawn clippings, brush and garden tools. In fact, you will find a hundred uses for it which will make you regard it as one of your indispensable back-yard accessories.

Even thoroughly decomposed compost is likely to contain many sticks, stones and bones; and valuable wood ashes from the fire-place are usually rich in wire, nails and tin. These are completely eliminated by the screen and at the same time the compost or soil is thoroughly pulverized. Incidentally, it is about the only method of handling chicken-yard litter for fertilizer.

Construction is simplicity itself. If one has a pair of discarded coaster or toy wagon wheels on hand the expense is limited to the cost of a piece of ¼ in. mesh galvanized screen and a pair of hinges and hooks, provided some old boards are available.

First make the frame as shown. The width of this will be determined by the length of the axle available. Standard width of toy axles, between the hubs, is usually 20 in. and this design is laid out accordingly.

Vary Size to Suit

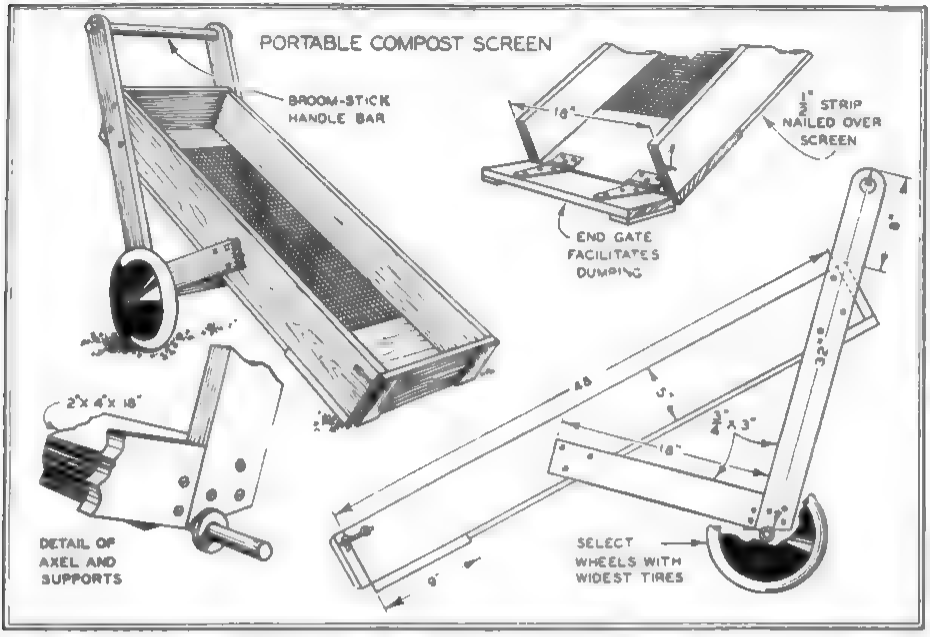
A convenient size for the frame is 18 in. wide by 48 in. long and 5 in. deep. The depth, however, may be varied to conform to the width of boards you have on hand. Construct as shown, with a hinged end-gate at the lower end for removal of rubbish. When in use the end-gate is held in place by hooks and screw-eyes.

The steel axle is attached to an 18 in. length of 2 x 4, and to this latter the frame supports are nailed as shown. These supports should be made of pieces of about ¾ in. by 3 in. lumber, or whatever is available of approximately this size. Two of the supports are continued beyond the frame about 8 in. and a section of broomstick installed between them for a handlebar.

If you have any choice, select wheels which have the widest tires so they will not cut into the soft soil readily. The neatness of this handy bit of equipment will be greatly enhanced by a coat or two of moss-green paint, with red wheels and the handlebar varnished in natural wood.

Last spring, by way of experiment—be-

Handy "Kinks" for Everybody

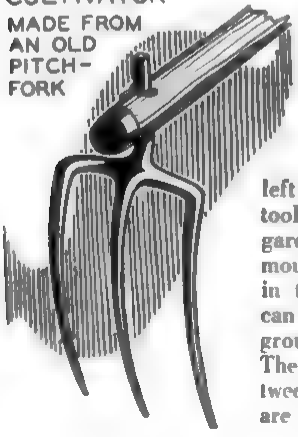


Simplicity of construction of the portable compost screen is well illustrated by the above drawings. The hinged end gate makes dumping easy, and the rubber-tired wheels support the heaviest loads.

ing very much an amateur gardener—the writer planted two beds of marigolds side by side. One of them had simply been spaded and turned over; the other screen-pulverized. Although the soil and light conditions were identical, the pulverized bed produced nearly twice as luxuriant a growth as its neighbor.

Paint Brush Putty Knife

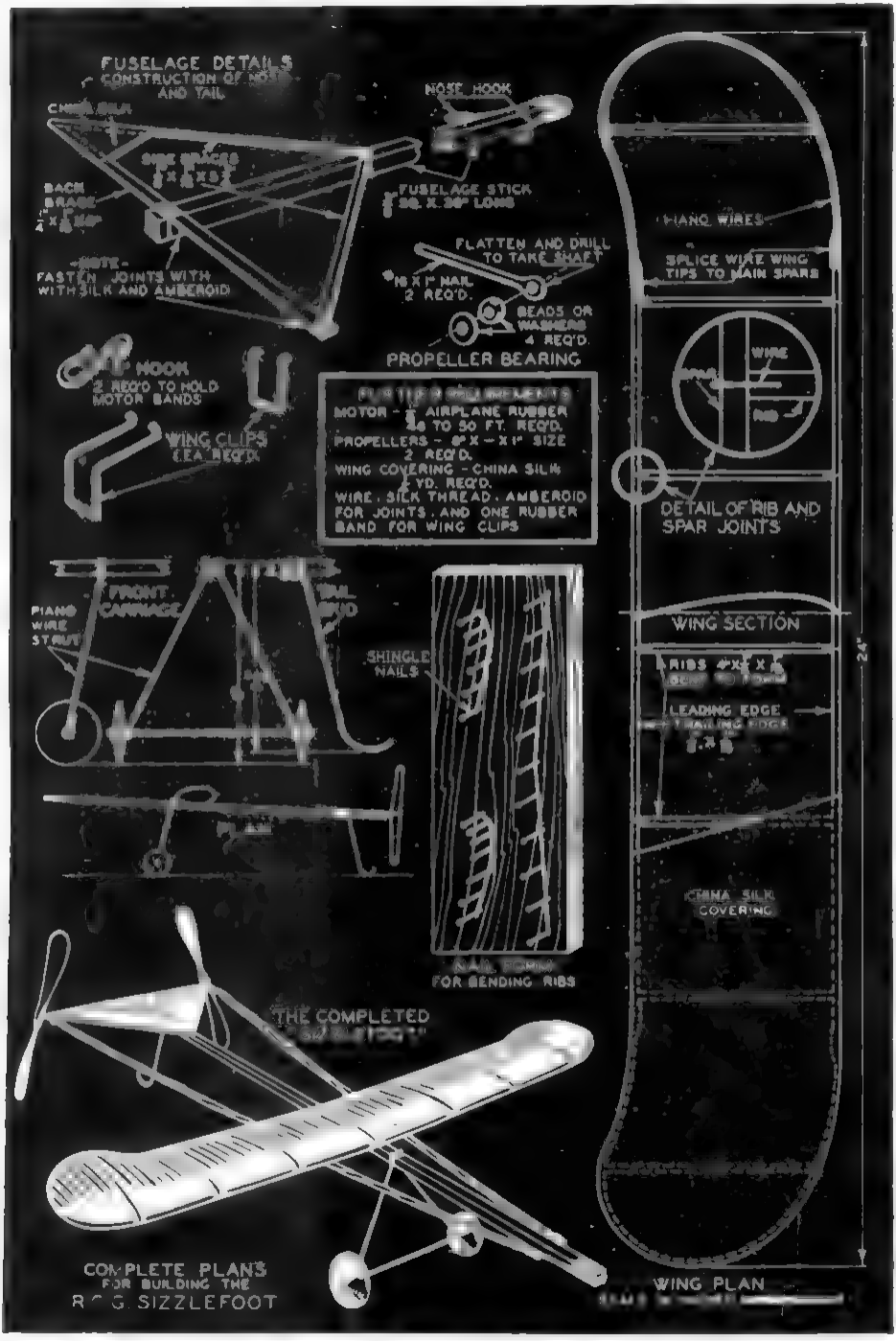
A HANDY combination tool which saves considerable time for the painter is the putty-knife paint brush pictured below. The paint brush and putty knife are often used together, and by mounting the blade in the handle of the brush as shown all that the worker has to do to bring either brush or knife into play is to turn the combination tool around in his hand. Both tools are thus instantly accessible.



Pitchfork Cultivator

FOR THE home gardener a pitchfork cultivator assembled like the one shown in the drawing at the left will prove to be a very handy tool for keeping weeds out of the garden. A three-tined fork is mounted through a broom handle in the manner shown so that it can easily be pulled along the ground like a large-size cultivator. The tines of the fork will run between the rows of plants if they are not too close together.

Complete Blueprint for Building the R. O. G. Sizzlefoot Airplane



PLANS *for an* R.O.G. "SIZZLEFOOT" *Model*

By THEODORE ALLEN

Here are plans for the well known Sizzlefoot model built by Fleming-Williams of England. Mr. Allen, an enthusiastic model maker, here tells of the short cuts which make this a quickly built r.o.g. model.

THIS model derived its name "sizzlefoot" from the fact that it had a single stick and a vee tail. This was soon corrupted into the initials s.s.v.t., and from there to the word sizzlefoot was a short step which Englishmen are so adept at taking when they are poking good natured fun at anything. And sizzlefoot she is! I know of no model which is so easily built, which will fly for such long distances, so fast, and with such little chance for cracking up.

She can be launched either from the overhead position, or the chassis shown can be attached and she will rise from the ground in a fine cloud of dust.

The fuselage consists of a tapering stick. The tail is a simple A frame covered with china silk. Propellers and bearings and even motors can be built at home if you wish.

The best procedure is to start out by completing the metalwork. The bearings are made by flattening one end of the light brads shown on the blueprint, and drilling a hole for the No. 10 piano wire. On several of these models built in our local high school manual training department, the wire served as a shaft very well.

The long fuselage stick tapers from $\frac{3}{8}$-inch square at the head to $\frac{1}{4}$-inch square at each end.

The nose hook, shown in the blueprint, is lashed to one end and the nail bearings are lashed to the ends of the cross brace at the rear of the fuselage. Then the rest of the braces are lashed into their places and the fuselage is complete. Use enough

Model Airplane Contest

Here's your chance to win real money with your model airplanes, you model building fans! Modern Mechanics' first model airplane contest, held a few months ago, gave the builders of rise-off-ground models a chance to show what they could do. This time the contest is for scale fuselage models and prizes will be awarded on a basis of neatness and accuracy in execution rather than on flying qualities. Models can be of original design or copies of actual commercial planes.

First prize will be $25; second prize, $10; and third, fourth, and fifth prizes will be $5 each. The contest is open to anybody except employes of this magazine. Closing date will be Sept. 1, 1929. In case of a tie, duplicate prizes will be awarded.

It will not be necessary to ship the actual models to this office; photographs will be sufficient. Bear in mind, however, that the pictures should be clear and should show your plane to best advantage, preferably from several angles. Remember, you have as good a chance as the next fellow to share in the prize money. Send those photographs in today! Address them to the Model Airplane Contest Editor.

silk thread, laid in a drop of ambroid, to do the trick.

The propellers can next be made. These are 8 by ¾ by 1 inch and are laid out by drawing diagonals in the usual way from one end of the block to the other, allowing a little for the hub. The ends should be rounded or elliptical. One propeller should be right hand and the other left, for by turning the motor in opposite directions, that is, winding the strands of rubber in opposite directions, the torque or twisting effect, is minimized and the flying qualities of the models will be greatly improved.

The rubber motor may be built by looping rubber bands, but this is not to be recommended if you can write one of the Model Supply houses, like the Ideal Airplane Model & Supply Company who have their products listed in one of the advertising pages of this issue of MODERN MECHANICS, and secure the rubber band motor. The rubber will need to be 40 to 50 feet in length. It is divided into hanks of 8 strands, after being divided for the two motors. Put one of the hooks into one end and hook it to the propeller. The other can go to the nose hook.

The airfoil of the wing is the usual curved form closely following the U. S. A. No. 4 section. It is not important on a model of such light weight as this to have the airfoil exact. The only reason that a curved airfoil is used is because it will lift a little more, but will at the same time be a great deal more stable. The center of pressure will not shift as fast. The model will balance and fly better.

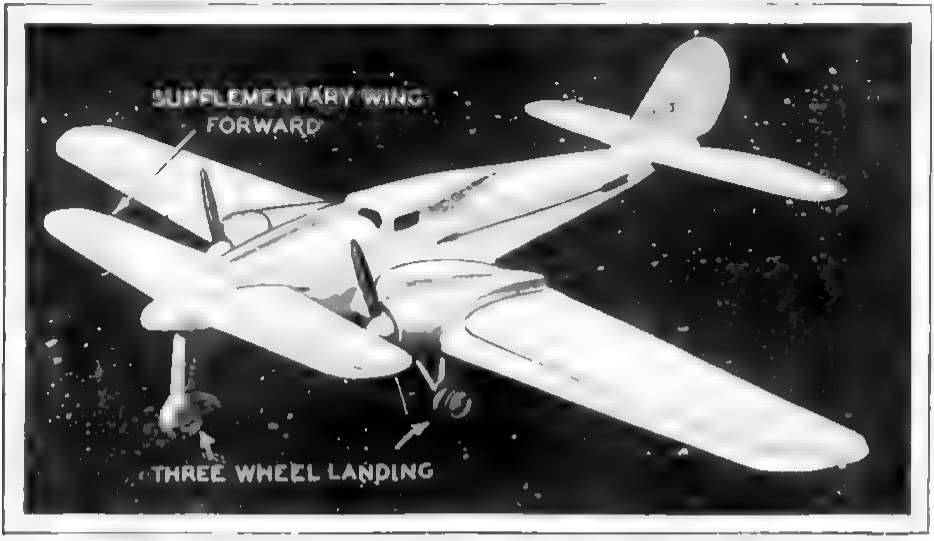
The wing plan for this sizzlefoot calls for round wire wing ends with leading and trailing edges of 1/16-inch by ⅛-inch stuff. The flat wing airfoil section ribs can be made by boiling the wood in water until it is soft, and then putting it into the nail form shown in the blueprint. When it has set overnight it will be ready to use. The dihedral for the wing, which stabilizes the model laterally, is put into the leading and trailing edges of the wing in the same way.

The wing is clipped to the fuselage with the clip shown. A rubber band is hooked over one end of the clip, led over the wing, under the stick, over the wing and back to the clip again.

The wing is covered on top with a layer of tissue paper or fine china silk such as the Ideal Model Supply will have in stock. An adhesive made by thinning ambroid with banana oil is used for tacking the fabric down.

To fly the model, hold it in front of you and give it several glides without the propeller turning. If it noses down, move the wing forward. If it noses up, move the wing backwards. It is then ready for flight. Take it to your nearest airport where you have at least 800 feet of field, for the sizzlefoot is a long distance machine, wind each propeller about 800 times. Face the wind, hold the model above the head, incline the nose up slightly and thrust forward. When on the ground it will rise of its own accord.

Designs New Plane to Insure Against Stalling in Air



INTRODUCING a supplementary wing forward and a three-wheel landing gear, this scale model of a new safety plane shown above was designed by George Fernac of New York. Possessing a 60-foot wing spread, the plane will be powered by two Wright whirlwind motors.

The center of gravity in the fuselage balance is therefore much further forward than in any other type of plane. Protection against stalls will be afforded by the forward wing and the three-wheeled landing gear, the designer claims.

Plans for a non-stop flight to Europe this summer in the new plane are being seriously considered. An attempt will be made to break the time record required for a trans-Atlantic flight. Note the streamline effect from the tip of the wing forward to the wind shields of the enclosed cabin.

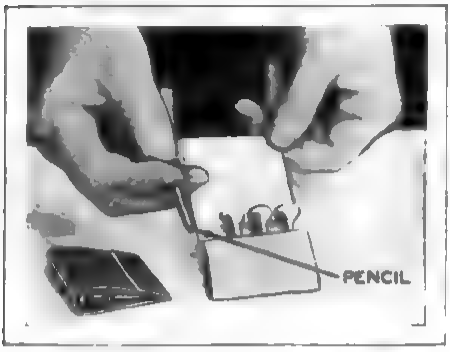
Police Dog Leads Sightless Pal Around the Streets of Washington

In addition to guide, Buddy is also acting as paper boy.

BUDDY, German police dog, and Teddy, his pal, attract large crowds in Washington when they take their daily stroll through the business section of the city. Teddy is 13 years old and is losing his sight. Buddy is only two and has more than his share of visual powers. Buddy therefore leads his blind companion around by means of a leather rope.

When they cross the street during the busy rush hours when traffic is heavy, Buddy waits with the crowd until the stop signal flashes "go". Teddy trusts his guide's judgment implicitly, following every tug.

No Need to Turn Pockets Inside Out for Loose Golf Tees



Four tees fit snugly in these cardboard packets.

GOLF tees put up in small cardboard packs like matches are easily found without an impatient search through their owner's apparel when tee-ing off in a game.

Four tees are contained in one pack. The inside cover is so arranged that score for an 18-hole foursome can be kept. One of the tees is designed with a tiny piece of pencil lead in its tip so that pencil and score card are ready for action at all times.

The packs are purchased at the clubhouse before going on the course. They are inexpensive and fill a need that every golfer appreciates.

It is both irritating and embarrassing to fumble around for loose tees.

Ancient Deeds and Maps Show Use of Primitive Farm Implements

HISTORY of the development of mechanical devices applied to land is told by an exhibition of old Sussex deeds and estate maps of England, arranged by Lady Wolseley and displayed at the public library at Hove. Some of the estate maps show farmyards with their buildings, together with agriculture implements in use at that time. A striking comparison with those in common use today is thus afforded.

An interesting light on life in the Middle Ages is revealed by the exhibition. The deeds are on parchment, excellently preserved, and in most cases executed with infinite care. A number still bear the old court seals.

Residents of England at the beginning of the seventeenth century apparently had a firm belief in the future stability of tenure. A land lease drawn up at Steyning March 1, 1601, was made for a term of 10,000 years. The earliest deed in the collection dates from 1282.

The maps give striking evidence of the slow-changing English nature in districts where urban development has not taken place. Outlines of fields and roads can be traced which have not been altered for many centuries.

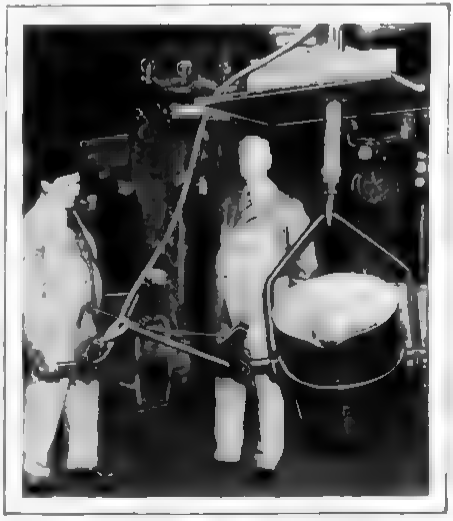
Will Decrease Foundry Cost

PERMITTING common laborers to do the actual pouring of hot metal while experienced moulders do the more complicated work of preparing the forms and getting them ready, this electrically controlled apparatus shown at right is expected to greatly reduce foundry cost.

C. E. Hoyt, secretary, and S. T. Johnson, president, of the American Foundrymen's association, are shown inspecting the device.

It is operated by the control handle which Mr. Hoyt is holding. Pressure of gas escaping from the boiling metal as it is being poured into the forms is measured on a gauge on the handle. Careful observation of this therefore eliminates the danger of the form blowing up from pouring the metal too fast.

The metal bucket is suspended from an overhead track that runs from the furnaces to the waiting forms.



Foundrymen's association officials inspecting device.

Youthful Drivers Race Tiny Cars in Annual Paris Event

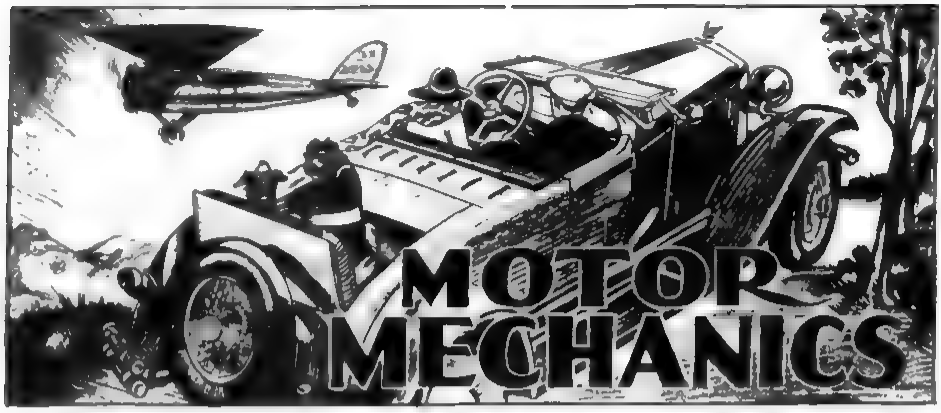
TWO hundred French youngsters lined their miniature cars in starting formation for the annual children's toy automobile race held recently in Paris.

The tiny cars, driven by small gasoline engines, were modeled after several different types of racing designs. A number were chain-driven and others were exact duplicates of large racers. When the starter's gun set the cars in motion, the staccato sputter of one and two cylinder engines filled the air as the youthful drivers "fought" for positions. The winning car attained a speed of 25 m.p.h. but was hard pressed by others.

Uncle Sam's Largest Ship Passing Through World's Biggest Ditch

THE giant aircraft carrier U.S.S. *Saratoga* is shown below passing through Culebra Cut in the Panama canal during recent maneuvers in South American waters. With its sister ship, the U.S.S. *Lexington*, the two craft are the largest in the United States navy. Their expansive decks are so designed that planes can land and take off easily while other airplanes are being overhauled and repaired on the side of the runway. The huge boat is shown passing "Gold Hill," through which Culebra Cut was dug.

Telegraphically controlled from the bridge, the Saratoga is maneuvered through the Panama Canal.



Edited by RAY F. KUNS

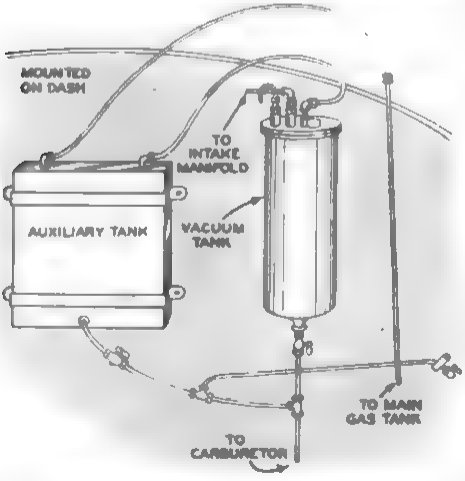
The wide experience of Mr. Kuns in the automotive industry qualifies him admirably to serve as editor of this department of Modern Mechanics magazine. He is principal of the Cincinnati Auto Trade School, editor of the Automobile Digest, and author of "Automotive Electrical Practice," "Automotive Trade Training," and other works.

This Auxiliary Gas Tank Supplies Fuel in Emergencies

AT A COST which at the most should not exceed a dollar or two, any motorist can attach an auxiliary gasoline tank to the dash of his car which will assure him an emergency supply of fuel when the main tank runs dry. The tank should be shaped of heavy galvanized iron and mounted to the dash by two metal straps as shown in the drawing below. An extra supporting strap on the back of the tank will give added rigidity.

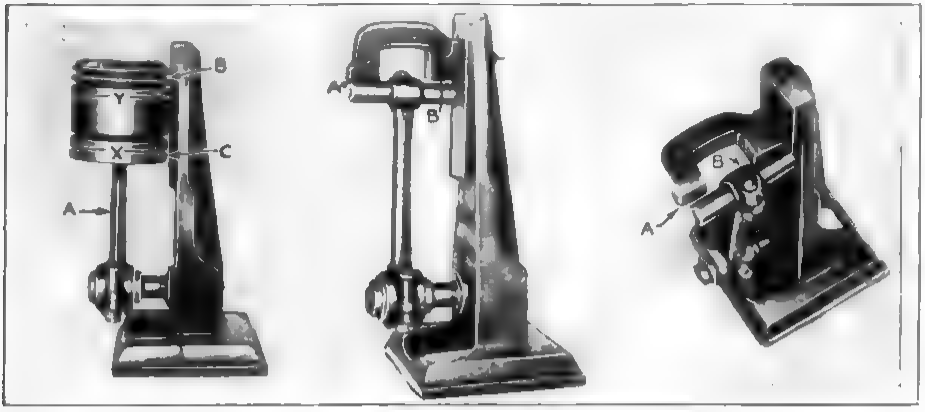
In the top of the tank solder two nipples threaded with ⅛ inch pipe threads, and into these screw brass compression fitting elbows. A similar attachment is made at the lower front of the tank, as shown. Having mounted the tank to the dash, disconnect the copper tubing leading from the main tank to the vacuum tank and couple to it sufficient tubing to connect with one of the elbows on top of the auxiliary tank. A short piece of tubing leads from the other elbow to the vacuum tank where the main supply tube was disconnected. To the elbow on the bottom of the tank is connected a short piece of tubing with a shut-off valve on its end. A "T" compression fitting is attached to the tubing in the position shown: one lead from this fitting goes to a petcock for draining gasoline whenever needed, and the other leads to another tee fitting in line between the bottom of the vacuum tank and the carburetor.

In operation, the shut-off valve at the bottom of the auxiliary tank is kept closed at all times. When the main tank runs dry, the opening of this valve allows gasoline from the auxiliary tank to feed to the carburetor, bypassing the vacuum tank. As soon as the main tank has been filled the shut-off valve should again be closed.



An auxiliary gas tank of sheet iron, connected as shown above, furnishes the autoist with a supply of fuel when the main tank runs dry.

Piston and Cylinder Scores Come from Misaligned Rods



The photos above illustrate the use of an aligning jig in determining whether connecting rods are properly squared up to work freely in the cylinder. The jig shows clearly how the distorted rods are out of plumb. Unnecessary wear on pistons and cylinder walls is caused by rod misalignment.

IT IS impossible for a piston to move up and down in the cylinder block in a free manner unless the piston pin is aligned with the crank pin on the crank shaft. If it is out of alignment in any way, the piston will scrape on the cylinder wall and this may result in scoring both piston and cylinder. It is certain to result in a noisy motor, and one that wears very fast. The photo at the left above shows a connecting rod which is sprung at point A. The piston is touching at B and is standing away from the jig at C. Since this piston has a greater diameter at X than it has at Y, it should be in contact at C and have .0025 clearance at B, this particular piston being .005 less in diameter across Y than it is across X.

The device shown with the connecting rod and piston is what is termed an aligning jig. It is designed to show the actual condition of alignment between the piston pin and the crank shaft.

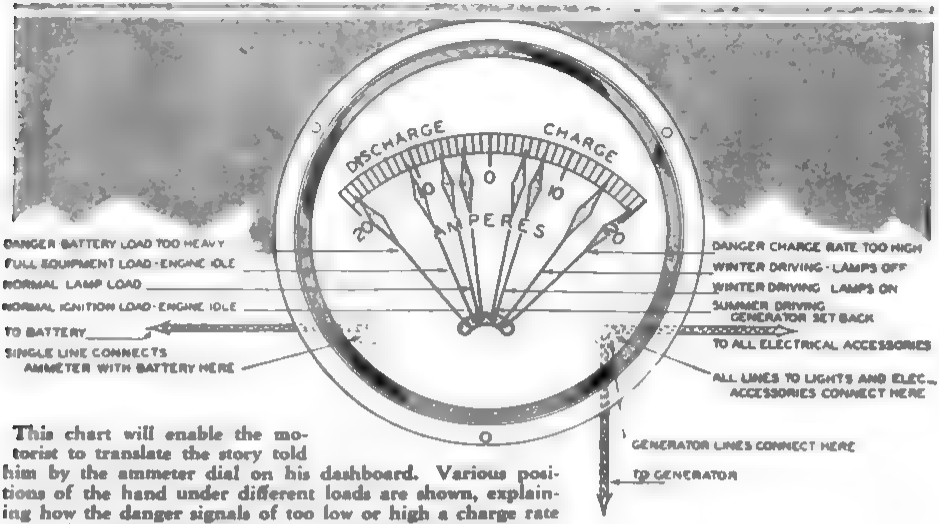
In the center photo the piston has been removed and another part of the jig placed above the pin. It is now apparent just why the piston does not align with the face of the jig. The piston pin is touching at A, and clearing at B. It should just touch at each point at the same time. The rod must be sprung to bring the pin in alignment. To do this use a heavy wrench on the rod, or place a steel rod through the piston pin and pull on it.

Even though the rod may be in proper condition to align the piston pin and crank pin as shown in the first two photos, twist may still exist in the rod. If this should be the situation the piston will be trying to twist as it moves up and down and will result in much wear and noise. The photo at the right above shows what is meant by a twisted rod. The points A and B should touch the jig at the same time.

Square Is Substitute Jig

These pictures show the reader just why it is necessary to have the piston pins and piston rods aligned properly. It may not be possible for the reader to do this work in his home workshop as the use which would be made of an alignment jig would hardly warrant its purchase. There are other methods of aligning rods which are fairly satisfactory. A square can be used, while the connecting rod is clamped on an arbor which may be a piece of cold rolled steel. By squaring up alongside the piston on each side of it, it can be found whether or not it is aligned properly. If the piston is removed and the piston pin replaced in the rod it is then possible to sight the pin past the arbor and detect any serious misalignment. Many home workshop owners do all the work on the pistons and pins outside of the actual alignment, and then have this job checked up in the service station where proper equipment is at hand. The cost is not great.

Ammeter Is Watchdog Over Automobile's Electric System

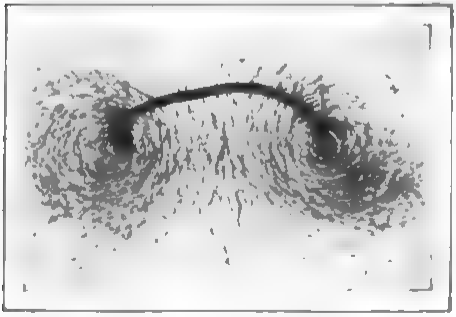


This chart will enable the motorist to translate the story told him by the ammeter dial on his dashboard. Various positions of the hand under different loads are shown, explaining how the danger signals of too low or high a charge rate are to be interpreted. Compare the readings with your car.

Do you know how to keep tab on the condition of your battery through studying the ammeter on the dashboard? Mr. Kuns explains its story here.

THE CAR owner who appreciates the exact function of the ammeter on the instrument board, is in a good position to know just how to handle his car with its electrical equipment so as to keep it in the best condition for trouble-free service. The diagram printed above shows the action of the ammeter hand in relation to the various demands and loads put on it.

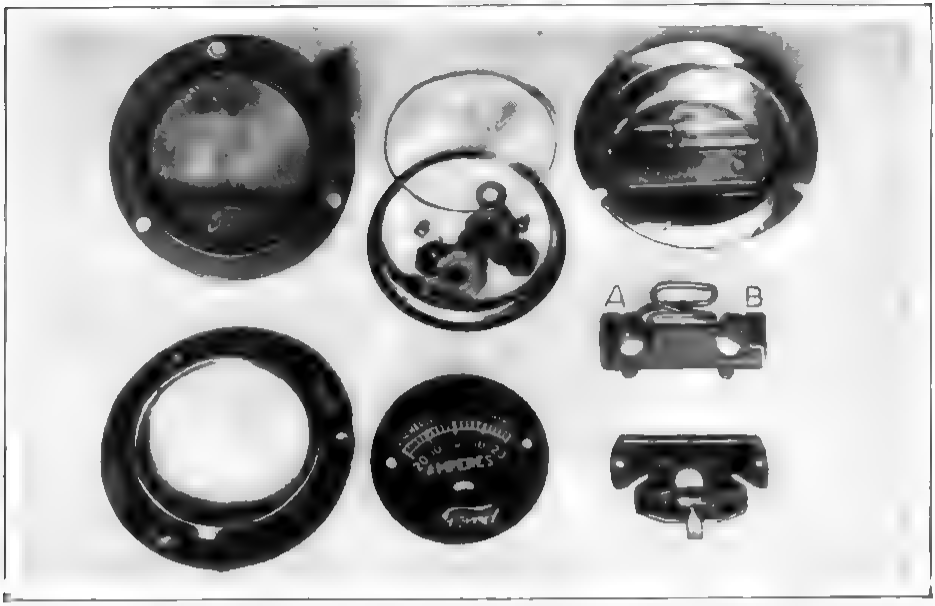
The ammeter hand ordinarily stands at zero, when the car is not in use. Referring to the chart, we notice that when the hand stands at 18 - 20 amperes discharge the load on the battery is too heavy. There would not be so great a load unless considerable extra equipment had been added to the car, such as extra lights, windshield wipers and items of that sort. A discharge of 18 - 20 amperes over a short period of time is not too heavy, but a constant load of that amount will exhaust the battery in four or five hours.



The principle on which the ammeter operates is shown by the above photo of iron filings responding to the lines of magnetic force set up by a current flowing through a wire.

The ammeter hand, which stands at from 10 - 12 amperes discharge with the engine idle and the full lamp, ignition and other equipment load, is performing in a normal manner. If the engine is started operating, the hand should then go to the charge side and stand around 5 - 7 amperes charge. At this point it would be well for the reader to remember that while the generator is putting out 10 - 15 amperes as a normal output, the amount shown on the charge side is only the surplus generated over the needs of the electrical equipment in use on the car.

All drivers are concerned about the summer and winter setting of the generator and the care which should be given the storage battery for the two seasons of the year when the demand on it for electrical energy



A complete ammeter is shown at upper left; grouped around it are disassembled parts. The simple coil, marked AB in the photo, sets up magnetic lines of force when a current passes through it, and this moves the dial of the ammeter. If the current flows from A to B, the dial is moved in one direction, and if the current is reversed it moves the opposite way. This registers charge and discharge.

varies so widely. This is a point long recognized by engineers and provided for by designing a generator so that the output of electrical energy from it is easily controlled. The rule, of course, is known by most drivers: Set the generator back to a low charging rate in summer and up to a heavy charging rate for winter driving. Under no circumstances should the charging rate be set up to such a high point that there is danger of burning out a generator.

The Danger Signal

On the chart it will be noted that 18 - 20 amperes is recommended as the danger point for the charging rate. 12 - 15 amperes is considered an average rate for winter driving. In rare cases of short runs, the rate may be set higher with safety. For instance a doctor, driving about town on many calls, could safely use a higher charging rate since the demand on the battery is very great and runs are short, not giving the generator a chance to overheat.

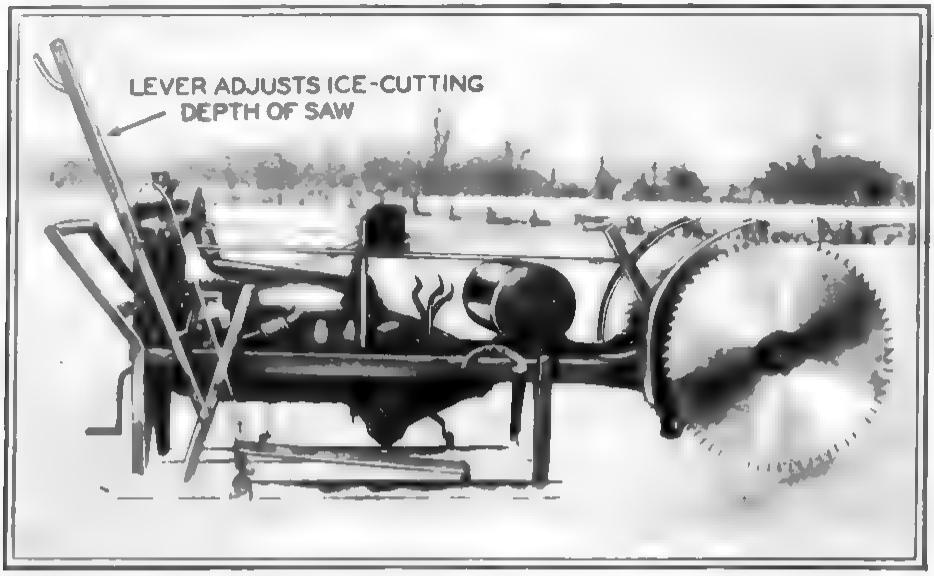
The chart also shows the position of the hand for winter driving with the lamps. It will be noted that this is about 7 amperes. The next position on the chart shows summer driving with the generator set back and lamps off. This should be 4 - 5 amperes.

This instruction would not be complete without reference to how the starting motor enters into the consideration. When you step on the starter switch the amount of current drawn from the average battery will run around 300 - 500 amperes, depending upon the car you are driving and the condition of the engine — stiff, cold or otherwise. After the engine has started turning, the amount drawn from the battery will drop to 150 amperes, which amount continues to flow from the storage battery as long as the engine is turned over by the starting motor.

The use of the starting motor, when touring in the summer time, is normally light. If the driver desires to reduce the state of charge in his storage battery quickly, the best way to do it is to leave the ignition switch off and crank the engine for a period of time from 3 - 5 minutes. This is not so good as having the charging rate set back and using the lamps when driving.

The ammeter tells you much but does not tell you all. Make a study of the chart and apply it to your own car.

Final Winners in the "New Uses for Old Fords" Contest

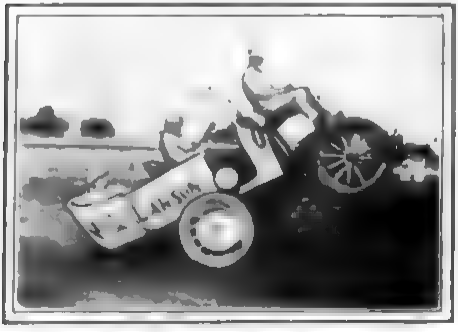


Ice-cutting is speeded up by this ingenious motor saw constructed out of an old Ford chassis. It was built by William Schmid of Orrville, Ohio. The same machine drags the blocks into the icehouse.

WITH THIS issue of MODERN MECHANICS the popular "New Uses for Old Fords" contest comes to an end. the new uses to which old "Lizzies" can be put seemingly having been exhausted. The two prize winners whose adaptations are presented on this page were each awarded $10 for their novel uses of discarded Fords.

The ice saw was submitted by William F. Schmid of Orrville, Ohio. He shortened the drive shaft and axles and used the regular Ford hub bolted to the saws. The transmission was left intact and the differential is locked by dropping three extra spider gears in the differential case. The lever adjusts the cutting depth of the saws as is desired. The apparatus is mounted on runners.

After the ice is cut. the same machine is used for hauling the product up the chute into the ice house. To accomplish this, the saws are removed, a drum is placed on the axle. and the hauling rope is thus harnessed to the machine.

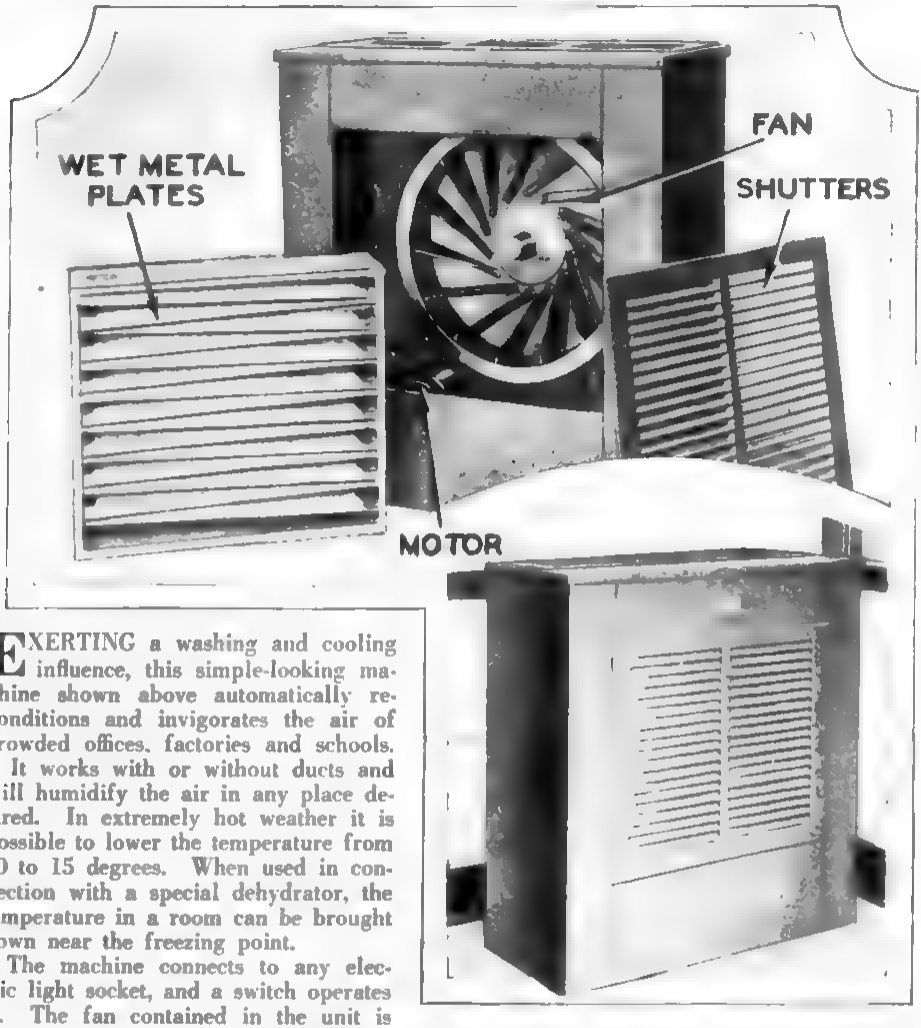


It's a real thrill, riding in this bucking broncho car which runs on its back wheels, lays a smoke screen, and everything.

ALMOST extraordinary Ford indeed is the one built by Joseph Masters of Perth Amboy, New Jersey. It is an unbalanced vehicle which stands up on its hind wheels, turns to right or left while in this position, jumps up and down, and throws a smoke screen giving it the appearance of being on fire.

The car is built by shortening the drive shaft 10 inches, bringing the rear wheels forward. External brake shoes steer the car to right or left when on its rear wheels. The smoke screen is produced by feeding light oil into the exhaust manifold with a pressure pump.

New Apparatus Automatically Cleans and Circulates Air



EXERTING a washing and cooling influence, this simple-looking machine shown above automatically reconditions and invigorates the air of crowded offices, factories and schools.

It works with or without ducts and will humidify the air in any place desired. In extremely hot weather it is possible to lower the temperature from 10 to 15 degrees. When used in connection with a special dehydrator, the temperature in a room can be brought down near the freezing point.

The machine connects to any electric light socket, and a switch operates it. The fan contained in the unit is designed to move the air freely and quietly. The hum of the electric motor is muffled by a patented process.

Air is cleaned by means of an ingenious arrangement of metal plates clamped firmly in a frame, which is removable from the cabinet. The plates are partially covered with absorbent material and kept wet. As air passes over the damp surface it is humidified and circulated back again.

Chicago Radio Fans Defeat Purpose of Broadcasting Crime News

RADIO broadcasting of crime in Chicago, in addition to notifying all police stations and gun squads touring the city of a murder or robbery committed, also has its drawbacks. Experience has shown that a great number of fans tune in on a station broadcasting crimes, and if it promises thrills, leap into their cars and hasten to the scene of action. Thus it frequently happens that when police arrive, they find the streets blocked with curious persons who have picked up the news over the radio. In many instances important clews have been destroyed.

Coo-Coo Concoctors Cop Cash

The popular Coo-Coo Contraptions contest closes with this issue to make room for other big contests. Winners in Contest No. 7 are announced below. See what you think of their fool devices!

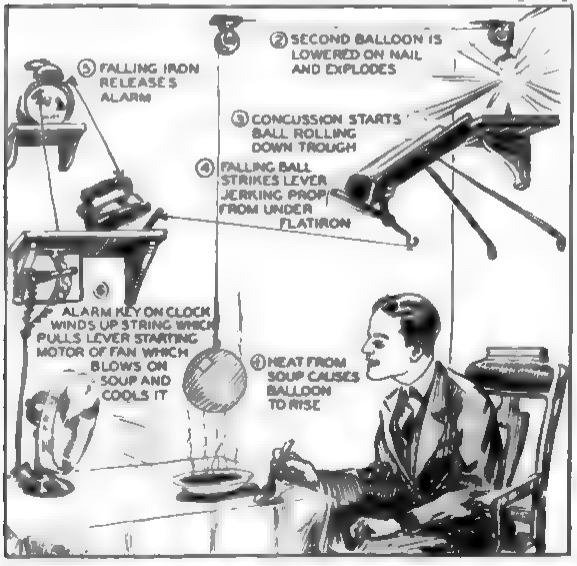
CONCOCTORS of Coo-Coo contraptions crashed through consistently in copping crates of currency for their prize-winning ideas in Contest No. 7, just ended. (After writing the above sentence, the Coo-Coo contest editor can easily be convinced that his monthly task of studying thousands of Coo-Coo contraptions has affected his mind some way or other.)

Anyhow, Coo-Coo Contraptions Contest No. 9, announced in the July issue, will be the last of the series. One of the most popular contests staged by MODERN MECHANICS magazine, the Coo-Coo Contraptions have had to give way to leave room for other big contests the editors are planning. All entries for Contest No. 9 must be received before Aug. 1, 1929. Contributions received after that date can not be considered.

Prizes in Contest No. 9 will total $50, distributed as follows: First prize, $25; second prize, $10; and five third prizes of $3 each. In case of a tie for any of the prizes, the full amount of the award will be paid to each tying contestant. Manuscripts will not be returned. You do not have to be a subscriber of MODERN MECHANICS magazine to enter this contest.

Now for the pleasant task of awarding the prize money to the lucky winners of Contest No. 7. Raymond Stephens of 203 East 18th Street, Davenport, Iowa, breaks the tape first and wins the first prize award of $25 for his Coo-Coo auto horn—"The Best in the State," he subtitles it, and the editor agrees that it ought to be a doggone good horn for getting results. The squirrel, cat and dog can be purchased at any animal store, with full directions for use on the outside of every package. The auto horn is so simple that you can attach it yourself in less than five minutes, or any mechanic should be glad to do the job for 25 cents.

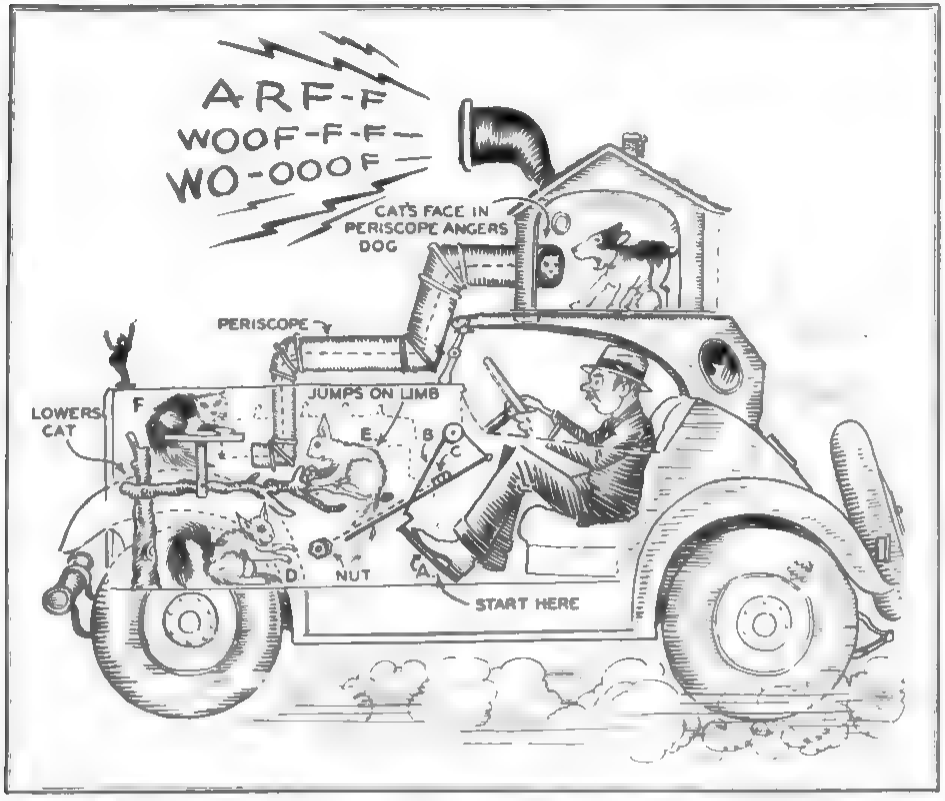
Second prize money—ten dollars, folks; step up and count it—goes to Wallace Nordvall, 529 North First Ave. East, Duluth, Minn., for his soup cooler. This is a device which folks too well versed in etiquette to blow on the hot liquid have long needed. Mr. Nordvall's arrangement not only appeals on account of its mechanical ingenuity, but also because the method by which it accomplishes its results cannot offend the most finically minded. An obvious advantage of the soup cooler is that it is automatically set in operation when the soup is served—no buttons to press, no levers to pull, no gears to shift. The expense of replacing the balloon which is destroyed each time the cooler starts to work will be found to be quite nominal, considering the results to be obtained.



Here's a good one for restaurant proprietors—an automatic soup cooler. This Coo-Coo idea won $10 for Wallace Nordvall of Duluth, Minn.

Five prizes of $3 each were distributed to the following: Alexander M. Adams, 313 Reed

This Coo-Coo Auto Horn Gets Results in Clearing Way Thru Traffic



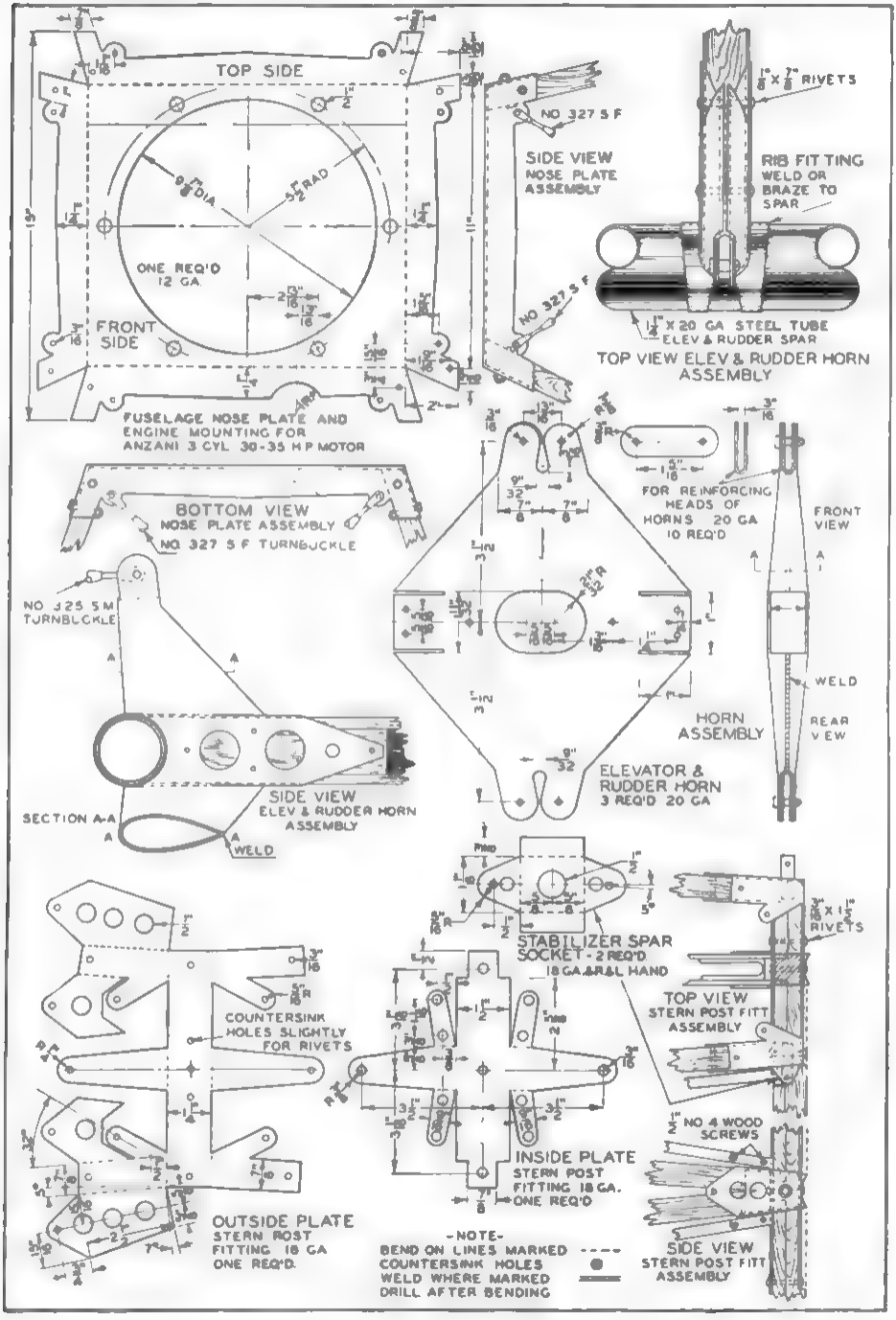
First prize money, $25, went to Raymond Stephens of Davenport, Iowa, for this Auto Horn. Here's how it works: Driver steps on lever A, which pulls cord B, lifting up rod C which has a nut on it. Squirrel at D grabs nut and runs out to limb E. Weight on branch pulls cat down on platform at F. Small dog looks into periscope and sees cat. Sight of cat enrages him and he barks and growls ferociously; sounds are amplified by horn—and traffic clears out of the way wondering what's coming!

Street, Clearfield, Penn., for his Patent Mouse Eradicator; E. G. Machauer, 1033 Jena Street, New Orleans, La., for his Traffic Violator Signal; Albert Bushell, 3671 Pt. Grey Road, Vancouver, B. C., for his Self-Watering Flower Pot; A. T. Abbott, Jr., Trevett, Maine, for his Fool-Proof Thief Frightener; and F. N. Sebaut, 804 Seventh Street, N. E., Canton, Ohio, for his Cigaret Lighter.

To all of these prize winners, and to the hundreds of others whose contraptions just failed to place "in the money," the Coo-Coo Editor extends his sincerest congratulations on the ingenuity displayed. Coo-Coo Contraptioning seems to be the popular American sport, judging from the entries which roll into this office every month.

In submitting your entry to the final contest, No. 9, which closes Aug. 1, bear in mind that the simpler and funnier your coo-coo idea is, the better its chance of winning a prize. Involved and long drawn out arrangements are not what is desired. Try to design your contraption so that it can be drawn compactly in one picture by our artists. The first prize winner on this page will give you a good idea of what is wanted. It is not necessary for you to make a finished drawing of your invention unless you so desire, although a sketch will be helpful if you can enclose one. A clearly written explanation of how your idea works is essential. Let's make this concluding contest the best one yet. Sharpen your pencils, fans, and get busy!

Well Designed Fittings as Shown Below Provide 11-1 Safety Factor



The beautiful little Lincoln Sport Biplane built by Fred Trump to the plans presented herewith. The photo shows the neat cowling job over the Trump converted Lawrence two-cylinder opposed motor.

Building the LINCOLN BIPLANE

Latest addition to Modern Mechanics' fleet of modern light airplane designs is this high performance, rugged, safe, fast little one place biplane which you can build with ordinary tools.

HI, THERE! How's the Hangar Gang this month? Here we have great summer weather—just the time you feel like getting out on the tarmac and cutting capers with a ship—if you've got one. And why not have one? MODERN MECHANICS, pioneer in presenting plans of all the leading light airplanes of the country, has added another coup to the magazine's list of publishing scoops in capturing the plans of the wonderfully efficient Lincoln Sport Biplane, which can be built from rudder post to prop cap from the plans now appearing in the magazine.

Frankly speaking, as explained last month, these plans are not for the rank novice, for rank novices have no business with the building of airplanes. But interest is at such fever pitch on the light airplane question, and so many of you fellows in the Hangar Gang are versed in plane construction, that the completely dimensioned set of plans presented in this Lincoln how-to-build series will give you who are "in the know" all the details you need. The plans as appear in the series are full and complete, just as the designer, Mr. Swanson, of the Lincoln Standard Aircraft Co., Lincoln, Nebraska, laid them out. Of course, to tell exactly every move to be made would require a book the size of this issue of MODERN MECHANICS.

In July the following detailed plans appeared: Details of fuselage fittings, to scale; blueprint of plan view, to scale, showing layout of the ship and the wing plan in relation to the fuselage; rib plan to scale; interplane strut plan, to scale, and

Lincoln Sport Plane Ready To Go

Fred Trump lines his little ship up on the tarmac preliminary to warming her up for a joy hop. He is shown above blocking the wheels.

blueprint of landing gear undercarriage. This month further details are set forth with a few constructional notes which should be sufficient to clarify how-to-build points for all save rank beginners. The details given this month will make the set of plans in your possession still more augmented, and next month the final details, making the plans complete from start to finish, will be published.

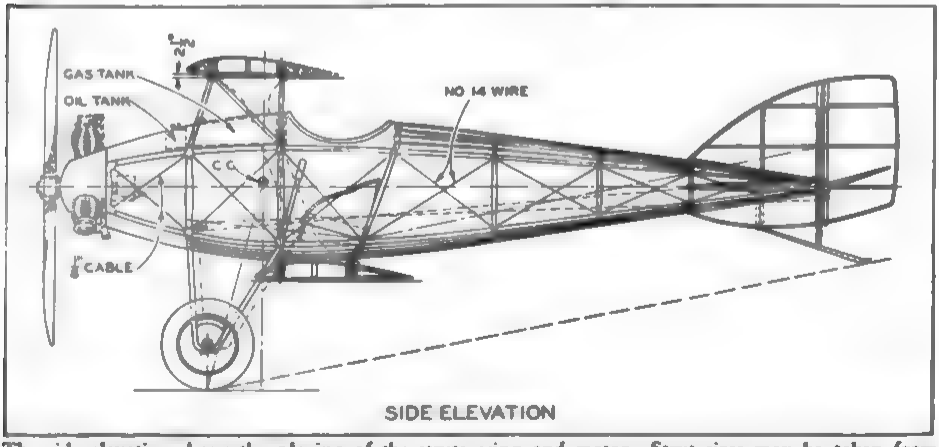
The side elevation calls for attention first. You can get a good idea of the 15¼ inch stagger, which gives the plane very good visibility. The longerons are ⅞-inch ash forward, and are spliced to spruce at the forward cockpit where the notation "No. 14 Wire" is seen. This follows practice which can be seen in any of the war time production ships, such as Jennies and Standards which may be near your local airport. These are long splices, with the length of the splice about eight inches in this case, securely glued with Curtis cold water glue, obtainable at any airplane supply house, and taped with pinked edging tape which is later doped to bind it.

The brace wiring is of No. 14 wire. The forward struts are ⅞ by 1¾ inches spruce, bellied a bit for strength fore and aft as the drawing shows. The placing of these may be ascertained by carefully scaling the drawing with dividers. As mentioned last issue the longerons and fuselage are shaped up in a rough box mold, and wired and trued to shape.

The front elevation will serve to give a very good idea of the trimness of this little ship. The control wires are run as shown in both views, with fittings to correspond to details illustrated on following pages.

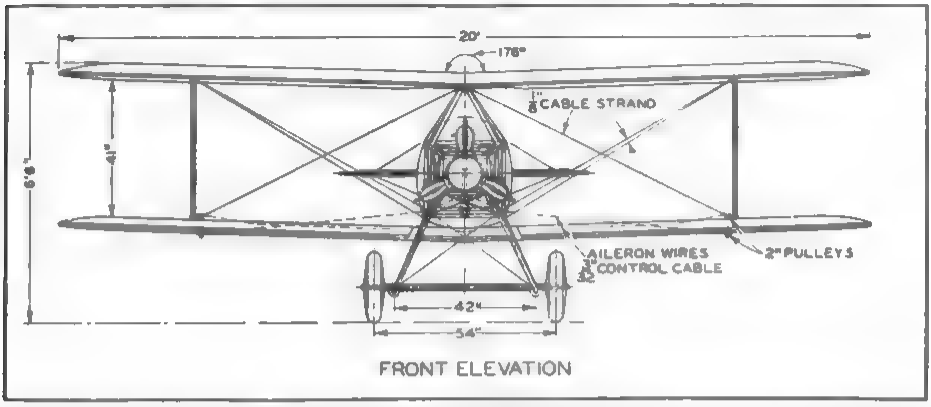
Plane Flies Well

In the upper left hand corner of this page you will see the plane built to these plans by Mr. Fred Trump, an enthusiastic light plane builder. Mr. Trump's plane is powered with a Lawrence 28 h. p. motor in which a two throw crank has been substituted to even up the power impulses, thus making the motor a true opposed job. Test flown by Speed Holman, holder of the world's outside loop record and judge of Modern Mechanics' Win Your Wings Contest, the little plane behaved well. Considering that Mr. Holman weighs well over



The side elevation shows the placing of the struts, wing and motor. Strut sizes may be taken from fitting details. Note the splice in the longeron. Ash is used forward, spruce to the rear. Details of the major tail framing will be found elsewhere in the series.

Dihedral of 4 Degrees Built Into Solid Wing Panel as Shown Below



The wings of the Lincoln Biplane, the plan view of which was shown in the last issue of Modern Mechanics, are built in one panel. The dihedral is built in. The spars of the wings are spliced in the same manner as the longerons.

200 lbs. and is about 6 ft. 4 inches tall, the ability of the plane to carry a usual load is well certified!

In the lower corner of this page, a shot of the framework of Mr. Trump's plane is shown. Rather than cut the lightening holes as per strict specifications in the details, Mr. Trump bored out lightening holes as may be seen in this picture.

Note that the wings are built in one panel, both upper and lower spars being built according to the wing plan in last issue, and having the dihedral built in. Further details on this construction will follow. The motor shown in the drawings is the 35 h. p. Anzani which will give the ship a top speed of 100 m. p. h.

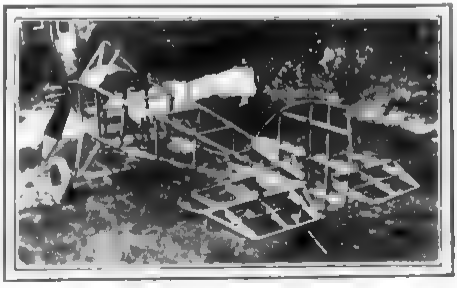
Motor Nose Plate

The motor plate or nose plate is the one for the Anzani 35, around which the ship has been designed, and which should be used to get real performance.

This is of 12 gage cold rolled sheet steel, which can be cut roughly to shape with a cold chisel or hack saw, and then filed and bent to final shape. The seam is not welded. The No. 327 turnbuckles, wired to the bay immediately aft, take care of all tendencies for the plate to unfold. Being nearly an eighth inch thick it is solid enough to hold the Anzani nicely. Mr. Trump built a mounting for the Lawrence similar to the one shown for the Alco Sportplane in previous issues. Such a mounting consists of arms of 12 gage running from either side of the fuselage to the motor cylinders, and a sort of U-bolt clamp around the cylinders for holding the motor thereto.

You will notice that the under wing of this particular design is solid too. The dihedral is built in in the usual way.

The wing is mounted in the same way as the famous Bristol Fighters had their lower wings mounted. The lower wing was blanketed but very little, and on maneuvering, side slipping and so on the ships are still the favorites of many a war time flyer. The mounting of the Lincoln sportplane lower wing is parallel to that of the Bristol and gives a wing which has little interference. The front edge is cut away in small boxes where the landing gear struts are in



The fuselage of Mr. Trump's plane before the fairing was built on. Note the lightening holes in the ribs of the tail assembly.

The size of the Lincoln Sport Biplane is vividly shown in comparison with the height of a five and a half foot man.

the way, but the effect is so small that the advantages more than outweigh the disadvantages.

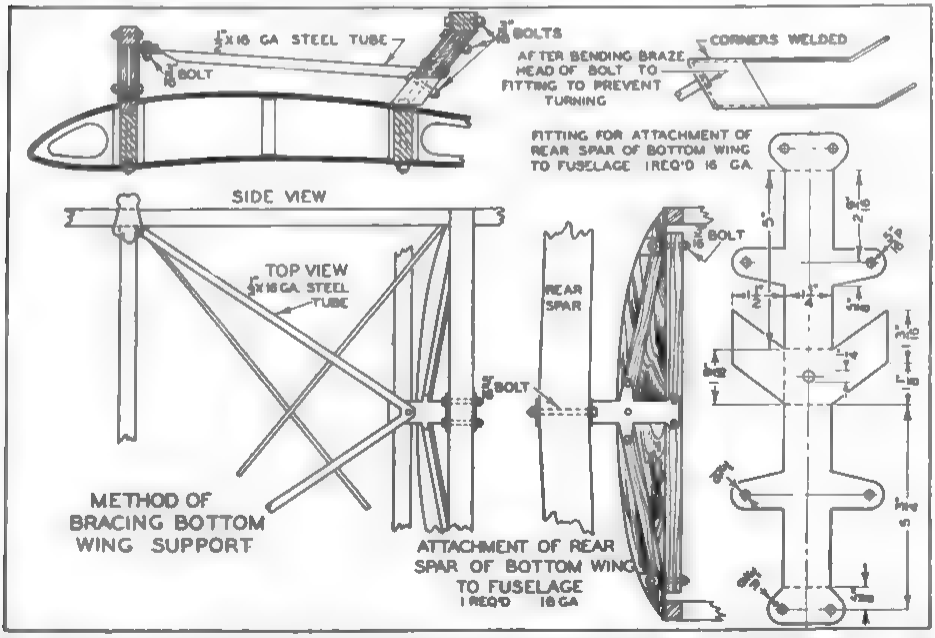
In rigging the wings the landing wires are first snugged home just enough to keep the wings lined up with the blocking you employ to set the wing panels aright. If you set them home too snug the splices in the spars will be apt to weaken. When the landing wires have been tightened just enough to take the load off the blocking, the flying wires can be set against them and the rigging is all done.

The strut fitting details shown on page 155 show clearly all of the essential major dimensions of the fittings which are used to anchor the struts to the longerons, and how the turnbuckles are anchored. The turnbuckles indicated may be purchased from the Heath Airplane Co., The Lincoln Standard Aircraft Co., Lincoln, Nebraska, or from your nearest supply house.

Mentioning supply houses calls to mind that Nicholas Beazely Airplane Co., Marshall, Mo., Marvin Northrup, 700 Washington Ave., Minneapolis, Minn., and the Johnson Airplane and Supply Co., as well as the Heath Airplane Co., of 1727 Sedgwick St., Chicago, Ill., all sell parts of the type required for the construction of this plane.

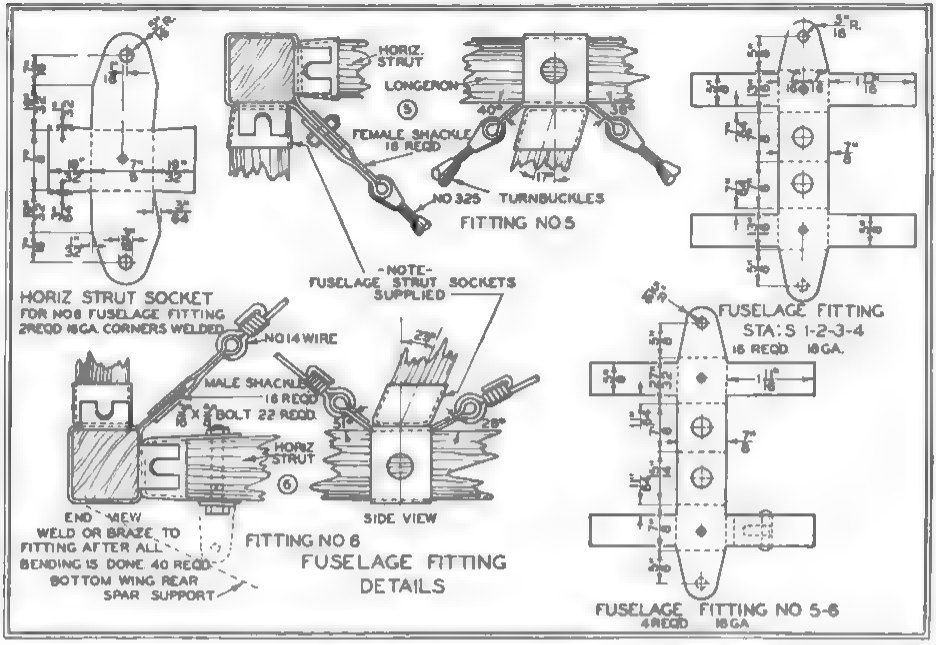
It is well to remember in the handling of the sheet metal that goes to make up the fittings of the Lincoln Sportplane no heating must be employed. The metal is cold rolled sheet steel, which is fairly hard, though mild. If it is heated it will lose much of its strength and the result is to invite disaster.

Wooden parts on an airplane such as this



The manner in which the lower wing is attached to the fuselage is plainly shown in this plan. The fittings rest on the spars, and there are two points of contact on the front spar and one on the rear spar. Half-inch steel tube is used for strutting.

Diagram of Strut-fitting Details Showing Strut Sizes and Shackles



The sizes of the struts, namely ⅞ by ⅞ inches aft of the cockpit, are shown in this drawing. The actual length of the strut will depend upon the fuselage layout. The way in which the turnbuckles and the fittings are joined is also made clear.

are few and can be made in comparatively few hours. It is the metal fittings in which the work to be done is concentrated that takes the care and time. For that reason the attention of the Gang is called to each of these little items as it appears.

Look at the last blueprint in the present article. You will find there the details of the fittings which make up the wing strut anchorages and flying wire attachments, which we have already noted in the remarks and pointers about rigging. You will notice the wing spars are hollowed out on one side, being 1 inch thick at the flange and half inch thick through the channel.

The elevator and aileron pulleys are shown in sufficient detail to enable their construction to be grasped nicely and without any complexity.

It might here be remarked that in anticipating the particular problems which the builder of the plane might encounter, that the mold previously mentioned for the building of the fuselage calls for a word.

As the fuselage is the same on the top as the bottom the mold can be made thus: the sides are formed out of 2 x 12 planks with the outline of the fuselage marked on them. The outline, or sweep from the nose plate to the tail post is sawn out, and on both planks. Then cross braces are put in.

Spacing of Cross Braces

These cross braces should be spaced about 4 inches apart, and may as well be 1 x 2 inches. This will allow you to get clamps in between so as to hold the longerons when they are bent to shape which may take a bit of hot, dry steaming to momentarily soften the wood. The longerons are left in the mold until they are such shape as to be readily bent to form when being rigged.

At this stage of the game it is well to be on the guard for the parting of the grain of the wood. Do not allow such splits to occur. The reason is obvious.

The small slight split is the fracture of tomorrow, and if difficulty is encountered in bending the longerons they should be

Simplicity Gives Ample Strength

One man has good room in the cockpit.

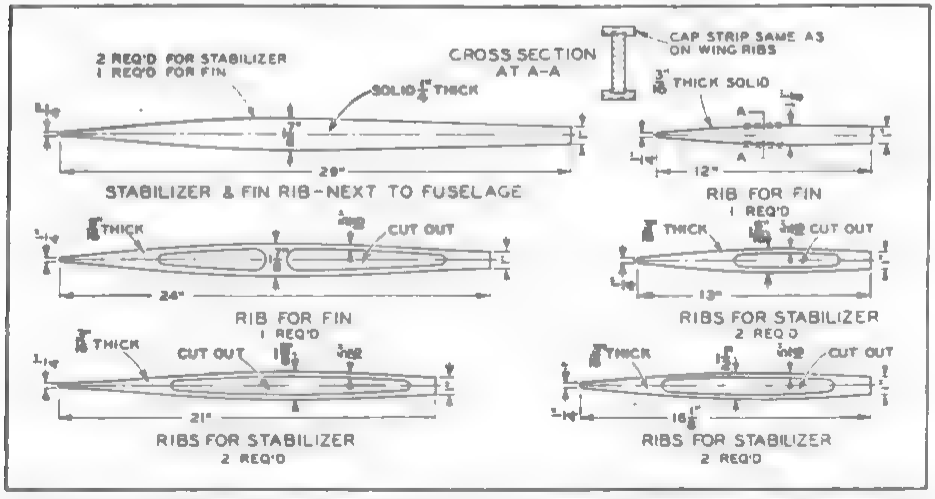
wrapped in cloth. They can then be bent without splitting.

A secondary word might also be here interjected concerning the gluing of the spars and the longerons. Glue if properly handled makes the best joint possible, and the splice, like a good weld, is almost always stronger than the original wood. Spruce is used in the wing spars of the Lincoln Sportplane, routed as previously explained, and the dihedral is built in where the wings are spliced. It would be impossible to get straight spruce of the span of the wing nor would there be any point in it. Therefore as the spar must have dihedral for stability, the dihedral is built in at the splice at this point. The splice is prepared by sawing the spars, which are solid at this point, at complementary angles, planing smooth, gluing, and pressing in a clamp on a form previously laid out to conform to the 176 degrees required as called for in the front elevation.

This clamp need be nothing more than a guide made by nailing two two by fours at the required angles along the floor. You will use them for but four gluings and they may then be taken up.

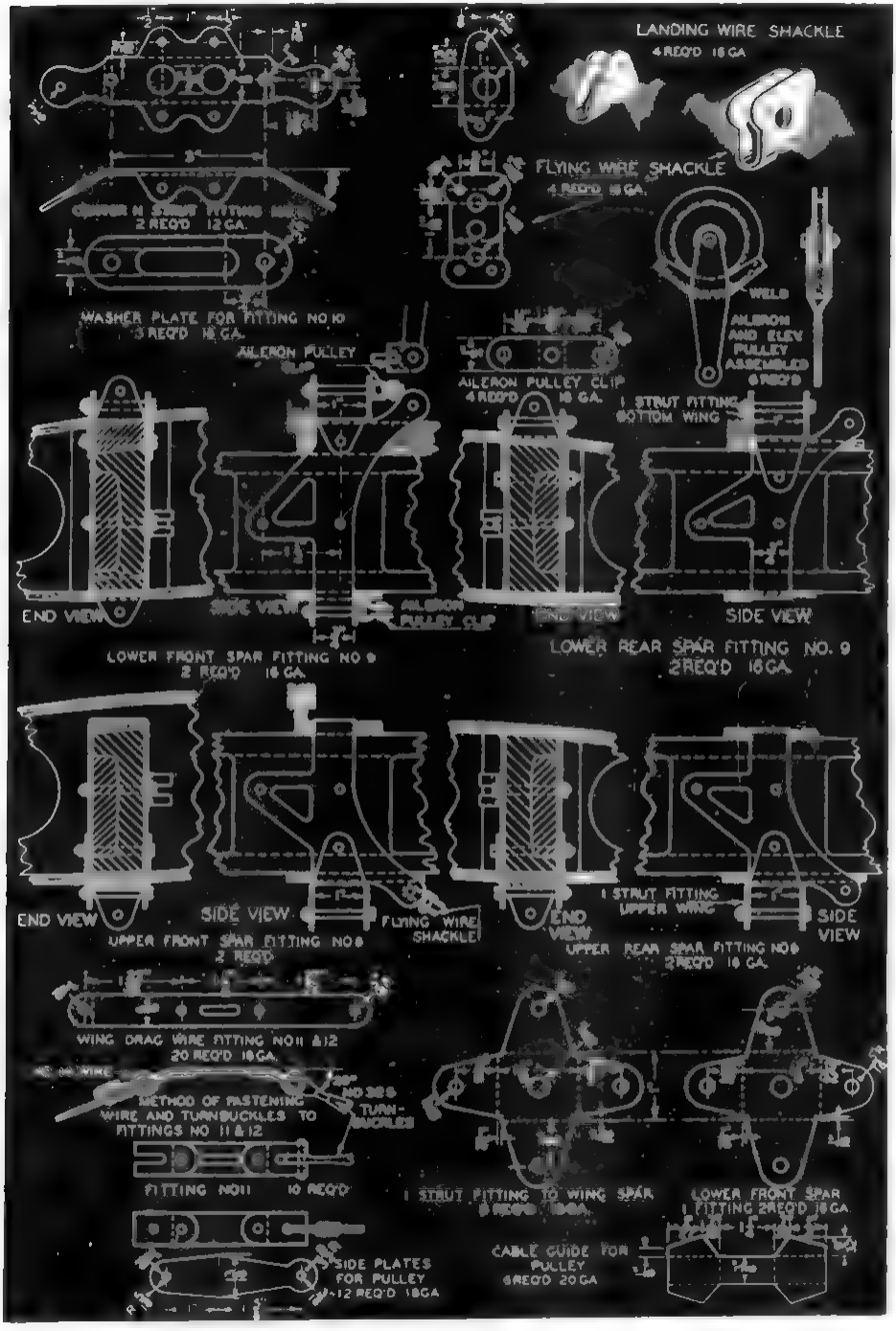
This method will assure you of having good glue jobs on the wings. The same care must be taken on the gluing of the longerons as to the facing and joining, and no worry will ever result from these points when you are in the air and are called upon to make the ship whine to get yourself out of a tight fix.

Next month the final plans in the series on the Lincoln Sportplane will appear.



The beautiful little Lincoln Sport Biplane built by Fred Trump to the plans presented herewith. The photo shows the neat cowling job over the Trump converted Lawrence two-cylinder opposed motor.

Blueprint of Fittings Shown Below Gives Accurate Building Dimensions



Electric "CREW" Mans

Broad drop windows afford an excellent view for the pilot.

Thirty-six electric motors take the place of attendants on this beautiful yacht built for Colonel H. H. Rogers of New York City — The height of electric luxury afloat!

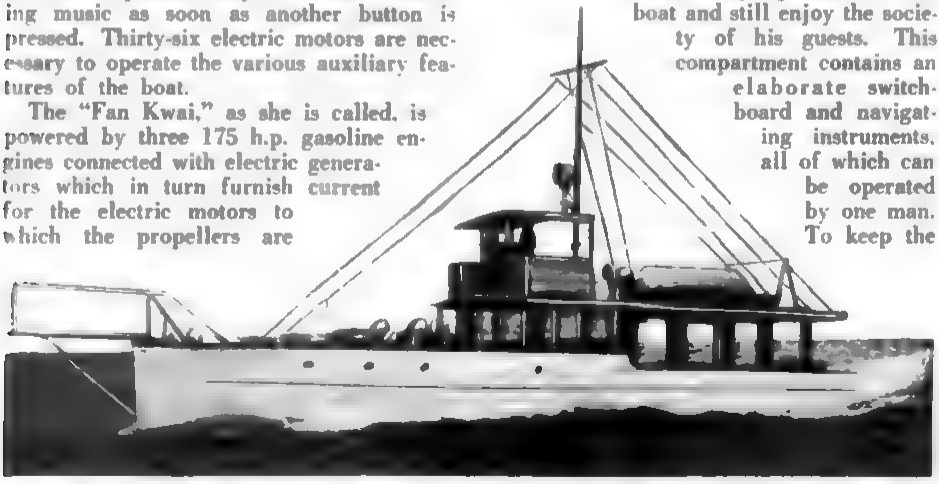
A 62-FOOT yacht whose electrical equipment is so complete that even the small task of raising a window is accomplished by pushing a button has just been built for Col. H. H. Rogers of New York.

If the weary yacht guest feels the need of recreation, he may push a button and, presto! From a trapdoor in the deck springs an electric piano, ready to furnish refreshing music as soon as another button is pressed. Thirty-six electric motors are necessary to operate the various auxiliary features of the boat.

The "Fan Kwai," as she is called, is powered by three 175 h.p. gasoline engines connected with electric generators which in turn furnish current for the electric motors to which the propellers are attached. This "hook-up" is something of a new departure in marine engineering for boats of Fan Kwai's type.

Flexible operation of the yacht is provided by this power system. The engines are self-reversible and may be used one, two, or three at a time. The electric control units are unusually compact, occupying a space of only 2 ft. by 3 ft. Marine engineers and automobile manufacturers are watching the development of this type of gasoline-electric power plant with interest, studying the possibilities of adapting the method to general yacht and motor car use.

The bridge deck is located at the forward end of the dining saloon so that the yacht owner may operate his own boat and still enjoy the society of his guests. This compartment contains an elaborate switchboard and navigating instruments, all of which can be operated by one man. To keep the



The "Fan Kwai," as the yacht shown above is named, makes a speed of 25 m.p.h. with a full load.

this Luxurious Yacht

Fan Kwai on level keel in a rough sea, a gyro stabilizer has been provided. When the water is so calm as to make life aboard ship monotonous, this device can be employed to give the boat a gentle rolling motion that simulates the swell of the sea.

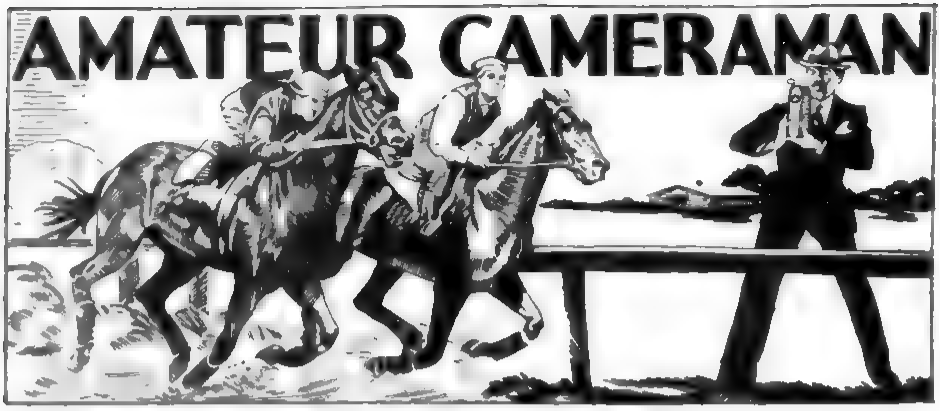
The galley of the Fan Kwai is elaborately equipped. A gas range with two ovens and a broiler is provided, with extra electric ovens supported from the deck overhead. These ovens contain revolving spits for roasting fowl or joints of meat by electricity. An electric refrigerator, an electrically scavenged garbage chute or "gurry bucket," a hot water heater and numerous drawers and lockers are other items of equipment found on the yacht.

In fair weather the craft may be operated from an auxiliary control room on the bridge. Center photo shows how an electric piano rises automatically from the floor at the press of a button. Electrical galley equipment for every conceivable use is shown in the lower picture.

Two dory type tenders are raised or lowered by electric davits. To swing the small boat up out of the water, it is attached to the davit, a button is pressed, and the dinghy automatically lifted and brought inboard on the movable davit arms. It is then mechanically turned upside down and stored securely in its cradle on the deck. Pressure on a different button reverses the operation. The heavy anchor is also raised by its individual electric motor.

The layout of the Fan Kwai includes the bridge deck, dining saloon, and after cock-pit, all forming a glass-enclosed room 31 ft. long and 11 ft. wide. The forward end of the cock-pit contains four jackknife windows which double up when a switch is thrown and house themselves neatly under the roof, which forms the boat deck on which the tenders are carried. Large columns supporting the boat deck line both sides of the cock-pit. Inside these are compartments for fishing tackle, and radiator pipes for heating the cockpit in cold weather when the yacht is used as a floating hunting lodge.

Housed in a drawer in one of the cabins are two radio receiving sets, one for short wave and one for long wave reception.



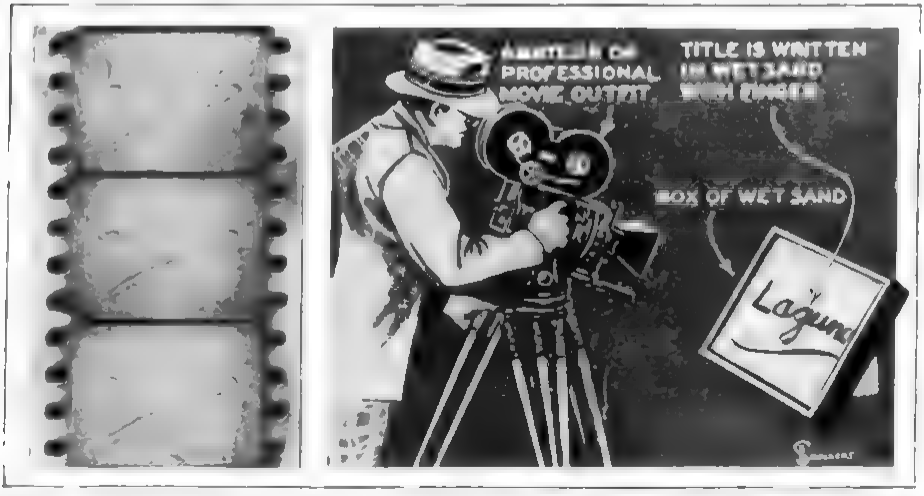
Edited by WALTER D. KERST

Mr. Kerst is an associate member of the Society of Motion Picture Engineers and a nationally known expert on the technical aspects of movie making. His professional production experience qualifies him to advise the amateur on securing best results from his home movie camera, and in this department every month, Mr. Kerst gives the amateur the advantage of his wide training.

Movie Titles Photographed in Sand Give Pleasing Effects

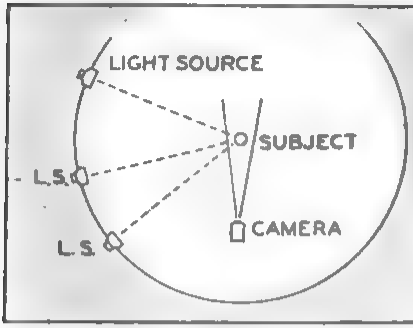
ANYONE who does any considerable amount of motion picture photography will welcome a quick, inexpensive method of producing titles which will at the same time afford a pleasing effect when shown on the screen. A trip to the beach suggested the experiment of writing with finger or stick upon the wet sand and photographing the results. That the titles thus produced will please the most fastidious eye is indicated by the reproduction of a strip of film below in which the word "Laguna" was photographed by the wet sand method.

A box of wet sand in the back yard will serve as well as a stretch of beach. A fine spray from the garden hose "erases" the lettering from the sand after the footage has been taken, leaving it ready for next title.



Either amateur or professional movie cameras can use the sand-box method of photographing titles diagrammed above. Observe the pleasing results on the finished film.

Light Source at the Rear of Subject Gives Depth to the Picture



Note the pleasing effect of roundness and depth imparted to the photograph of the little statuette at the right through locating the light source at one side and slightly to the rear of the figure. The drawing above indicates the positions of camera and lights in producing these attractive lighting effects.

"KNOW the light" is a command that every amateur should heed if he wishes to get the most from his efforts.

If you will study the illustration of the little statue you will note the beautiful modeling achieved through the placing of the light source to one side and slightly in back of the figure. When the light is placed in this position there will always be present in the finished film a sense of roundness or depth, in other words, a third-dimensional effect. A reflector, used on the other side, opposite to the light source, will light up the side that is in shadow, showing much or little detail, dependent on the type of reflector used and the distance it is placed from the subject. If this particular subject has been shot in a flat light, that is, with the light source in front of and slightly above, the result would have been flat.

The subject shown was made with artificial light, because it was more convenient and illustrated well this particular point. The same principle, however, can be applied when working outdoors with natural light. The following diagram shows various positions of the light source in relation to the camera and subject. These three positions, either to the right or left of subject and camera, will give the necessary roundness and depth and add interest and beauty to the pictures on the screen.

The Amateur Cameraman's Ten Commandments

1. Keep thy camera, projector and screen clean and free from dust and dirt.

2. Honor thy lenses. They are the heart, soul and body of thy hobby.

3. See that thou achieve steady screen pictures. Get thee a tripod.

4. Do not shoot without thinking. Let not thy "fool-proof" camera lead thee to think that thou art likewise.

5. Edit everything that thou receivest from the finishing station. Commit not the sin of laziness against the sacred duty of EDITING.

6. Do not commit carelessness.

7. Thou shalt not commit murder—that is, murder of thy subjects on film.

8. Thou shalt never show un-edited pictures and cause suffering and anguish.

9. Leave ye not one step in the game to pass on to the next until you have mastered the first.

10. If thy work should go wrong, look ye first to thyself, not to everyone else but.

Home Projectors Show Talking Pictures with Synchronizing Unit

Perfect synchronization of sound and picture is assured by the home talkie outfit pictured above, since the same electrical connection operates both the phonograph and the projector. A hook-up with the radio set amplifies the sound.

THIRTY years ago it was the penny circus in the barn; today it is the sound film in the parlor. The standards by which the showmanship ability of the younger generation was judged have not budged in these 30 years, but the means by which it is perpetuated has changed beyond recognition.

More specifically, the Home-Talkie Machine Corporation, of New York, N. Y., has given the modern parlor exhibitor a new medium of showmanship in a device that will attach to any home film projector, and which, when plugged into the radio set, amplifies wax disc records in perfect synchronism with the picture.

In appearance, the home talkie unit, as it is called, resembles a miniature phonograph, being simple in construction, compact and portable. Perfect synchronization of sound and picture is assured at all times by the fact that but one motor drives both projector and talkie unit. A flexible shaft connects the turntable to the projector, and an adjustable driving mechanism governs the speed of rotation, so that regular phonograph records may be run on it, thus eliminating the need of a phonograph. An electric pick-up is connected with the radio set through a volume control and extension cable. The regular radio loud speaker is used and is placed near the screen for best results in maintaining the illusion of the talking picture.

The device is not necessarily sold with a projector. For those who already own projectors the problem of acquiring a home-talkie unit, so far as expense is concerned, is no greater than that which confronts the radio fan planning to buy a new set of tubes.

An interesting feature of the device is the "ripple killer." Ordinarily, the vibrations of the motor and the fluctuations in the motor speed would communicate itself to the talkie unit, causing distortion and otherwise affecting the quality of the sound. The "ripple killer" is in this case a mechanical sedative and shock absorber combined, ironing out the effects of motor oscillations.

Coincident with the launching of the home-talkie unit, the company has released ten film subjects produced by its own studio.

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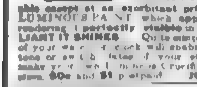


CIGARETTE MAKER

Roll your own and save money. Better and quicker, saves more than half. Use your favorite brand of tobacco. Neat, useful, handy. Pocket size, weighs 1½ oz. Made entirely of metal, nickel plated. 25c, 3 for 60c postpaid anywhere.

GOOD LUCK RING

Very striking, quaint and uncommon. Silver finish skull and crossbones design, flashing genuine ruby spark or fire. Fits over end to bring good luck. Only 25c ea.

Exploding Cigarettes

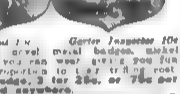
JUST LIKE ORDINARY CIGARETTES, BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but on each cigarette is about an inch cut, and the victim is in for a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. 10c per box, 3 for 25c, 12 for 75c postpaid.

NOVELTY BADGES

Masonic Pennant 10c *Garter Inspector 10c*

Two very novel metal badges, nickel plated that you can wear giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.

MIDGET BIBLE

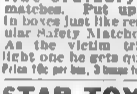


GREAT CURIOSITY. Smallest Bible in the World like at a postage stamp. 240 Pages to bring luck to owner. A genuine work of art. Might be one to be appreciated. Make good money selling them to friends during spare moments, etc. PRICE 10c each, 3 for 25c, 12 for $1.00, 100 for $7.50. Also obtainable in Leather Binding with gold edges. Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass for use with Midget Bible 10c.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. 10c Prices 10c per box, 3 boxes for 25c, 12 for 75 cents.

STAR TOY MAKER



Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages, 150 illustrations. PRICE 10c postpaid.

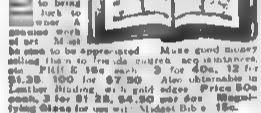
STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, these genuine bills will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or $1.50 thousand postpaid.

Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers. Lay the hand down and look through the opening in a piece of stem, and many other amazing things. A mystery that no one can solve. Satisfactorily explains. Price 10c, 3 for 25c, 12 for 75c. Johnson Smith & Co.

MAGIC NOSE FLUTE



The Magic Nose Flute, or Humanatone is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which when once secured after a little practice will enable you to produce very sweet music, the somewhat resembles a flute. There is no fingering and once you have mastered it you can play all kinds of tunes with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is so charming as to be surprising.

Postpaid 10c

NOSE BLOWER

When some one buys them, I know it sounds like a trombone. Now the *NOSE BLOWER* has come to torment us. It is a startler! It is ingeniously concealed in the handkerchief. Pretend to blow your nose and your friends will think they heard a steam engine or something. You can imagine the hideous noise to your having a very bad cold and keep up the fun as long as you like. *PRICE 10c 3 for 25c, or 75c doz postpaid.*

Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually lengthens itself into a snake several feet long, which curls and twists about in a most lifelike manner. Price per box, 10c postpaid, 3 for 25c.

JOHNSON SMITH & CO.

Dept. 918, RACINE, WIS.

A Big Large Edition of our new 1920 CATALOG mailed on receipt of 25c. Handsome Binding. Bigger and better than ever. Only book of its kind in existence. Nearly 600 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, and hundreds of interesting books, curiosities in coins and stamps, etc., unprocurable elsewhere. Remit by Coin, Money Order, Check or unused U. S., Canadian and Foreign Stamps for all articles listed above.

BLANK CARTRIDGE PISTOL

Protection against Burglars, Tramps, & Dogs Special Offer

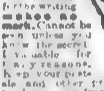
Well made and effective, modelled on latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard 22 Cal. Blank Cartridge—obtainable everywhere. Special CASH with order offer: 1 Inquiring quality Blank Cartridge Pistol, 100 Blank Cartridges and our new $5 (De Luxe) Catalog of latest novelties, a for only $1.50. Shipped by Express only. Cannot be sent by parcel post. Extra Blank cartridges 50c per 100. Special Holster (Cowboy Type) for pistol 50c. No C.O.D. shipments.

Catalog Price $1.50 The Lot Shipped by Express Only Cash With Order Only

LOOK 35¢ LOOK Wonderful Instrument.

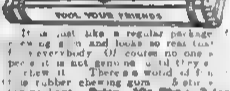
Greatest thing yet. Nine useful articles in one. Everybody delighted with it. Odd, Curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Glass, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail only 35c or 3 for $1.00. JOHNSON SMITH & CO., DEPT. 918, RACINE, WIS.

INVISIBLE INK



The most confidential messages can be written with this fascinating ink and no one will know the secret. Even under the strongest microscope no mark. Cannot be seen unless you know the secret. Everybody will keep your private affairs and other private matters to themselves. Handsome package. Price, 10c Pkg., 3 for 25c; 12 for 75c postpaid. Great fun for playing practical jokes. Only 15c a Bottle; 3 for 40c. Johnson Smith & Co., Dept. 918 Racine, Wis.

Rubber Chewing Gum



It is just like a regular package of chewing gum and looks so real that everybody. Of course no one expects it is not genuine but they chew it. There's a world of fun in rubber chewing gum. 5 cents a package. Price, 10c Pkg., 3 for 25c; 12 for 75c postpaid. Johnson Smith & Co., Dept. 918 Racine, Wis.

Watch Charm Pistol $1.75

Exact reproduction of a real pistol, actually fires REAL BLANK CARTRIDGES of immature size. Illustration is actual size 1½ inches long, with ring at end for attaching to watch chain. Loads like a regular pistol. Has safe trigger and it goes off with a loud report. Pistol is break open type for loading. Has military hammer spur and nickel plated metal handle with engraved handles. Complete in box with cleaning rod. PRICE $1.75. Also furnished with pearl handles, $2.50. BLANK CARTRIDGES, 50c per box of 20. JOHNSON SMITH & CO., Dept. 918, RACINE, WIS.

MICROPHONE TRANSMITTER BUTTON

$1.50 Postpaid

You can easily make a highly sensitive detectophone by using the Transmitter Button to convert the sound waves. You can build your own outfit for the following expensive equipment. It is simple and inexpensive. You can install it in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. You could use one by servants or operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in microphones. You can mount the button almost anywhere—cardboard boxes, stove pipes, stiff oilcloths, or on the wall behind a picture frame etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to a phonograph, piano or other musical instrument, it may can be heard hundreds of feet away. Button may be used to renew telephone transmitters, often makes an old line "talk up" when nothing else will. The ideal microphone for radio use, carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. PRICE $1.50.

[illegible] & CO., DEPT. 918, RACINE, WIS.

BOYS! BOYS! BOYS!

Throw Your Voice

Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.

THE VENTRILO

is a little instrument that fits in the mouth out of sight. Cannot be detected. It is used in connection with the above, and with the aid of this wonderful **DOUBLE THROAT**, or **VENTRILO**, you can imitate many kinds of birds, animals, etc. Remember you get everything for **ONLY TEN CENTS**—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the **Double Throat**, or **Ventrilo**, and our big 600 page catalog of novelties, tricks, puzzles, masks, books, etc., **ALL SENT POSTPAID TO ANY ADDRESS FOR ONLY 10 cents**

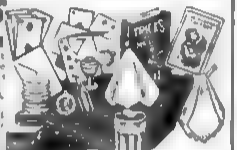
LEARN TO PITCH

By the world's greatest pitchers. Prepares you mentally, morally and physically to become a great baseball player and a great athlete. Special course of lessons by **CHRISTY MATHEWSON**, who explains the secret of how to throw the great **"FADEAWAY"** ball, so much feared by the great batters; **ED WALSH**, the pitcher who discovered the secret of throwing that famous, mystifying and unfathomable **"SPIT BALL"**; **JOE WOOD**, the **"Smoke Ball"** marvel, next to the speediest pitcher in the world **WALTER JOHNSON**, the man who has struck out more league batters in a single season than any other pitcher known; **NAP RUCKER**, inventor of the **"Knuckle Ball"**; and **DOC WHITE**, who teaches you the art of **Shadow Pitching** by which you can develop control and speed necessary to become a star pitcher. Clearly described and illustrated by 56 pictures. Everything complete for **ONLY 25 cents postpaid anywhere.** Nothing more to buy.

MAGICIAN'S BOX OF TRICKS

Apparatus and Directions for a Number of Mysterious Tricks. Enough for an Entire Evening's Entertainment $1.00

ANYONE CAN DO THEM



It is great fun entertaining your friends. Get [illegible] and you will be the center of attention wherever you go. The apparatus consists of [illegible] as well as a pair of [illegible] and a pack of [illegible] cards. [illegible] TRICK. Make cards disappear and reappear in unexpected places. [illegible] TRICK. Make cards vanish [illegible] NUMBER TRICK. [illegible] CARD TRICK. [illegible] TRICK. [illegible] CARD TRICK. [illegible] TRICK. [illegible] CARD TRICK. [illegible]

See How Easy You Can Get
A BUSINESS OF YOUR OWN
This New Way

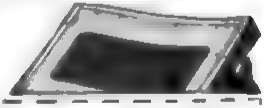
SEND your name and address for a new FREE book which gives facts that will surprise you about Modern Photography. It tells of an amazingly easy way to start your own business quickly, with very little capital. It also shows how hundreds of other men and women are making real money in spare time taking pictures.

Many Earn $35 to $90 a Week

In this day of pictures, photographers are making more than ever before. In this book you are told how such men as Hughes of Kentucky made $97 in two days, how Sager of Pennsylvania earned $700 during spare time in a few months.

Look into the new opportunities in Photography—and see why newspapers, magazines and photogravure sections use thousands of photos a month, and pay big prices for them. Business firms are constantly in the market for photos to be used in catalogs, booklets and advertising. Portrait work pays big. Just mail the coupon for this FREE book. It explains how our home training program in Modern Professional Photography enables you to quickly learn this fascinating, profitable work in your spare time. Mail the coupon this minute for your copy.

Now Sent FREE



AMERICAN SCHOOL OF PHOTOGRAPHY
3601 Michigan Avenue,
Dept. 205-C, Chicago

Please send me free and without obligation my copy of your startling new book *Opportunities in Modern Photography*, and full information regarding your home study course

Name .....

Address .....

City ..... State.....

Under the Pole in a Submarine

(Continued from page 42)

needed to melt a hole sufficiently large to accommodate a small conning tower.

A feature we propose to use for protection and for determining thickness of the ice and the open leads is a feeling arm connected through a universal joint to the top of the submarine. This arm will extend thirty or forty feet above the top of the vessel and by means of a governing spring keep the submarine—which will at all times have positive buoyancy, or a tendency to rise—at an even distance beneath the surface of the ice. It is not expected that the under surface of the ice will be smooth but the irregularities, except in rare instances, will not be great and in no case so great as to allow the body of the submarine to strike a projecting tongue or foot of ice.

"Jumping Bar" Protects Sub

As a double precaution against this possibility the upper side of the vessel will be protected by a resilient jumping bar or skate. This skate or sled runner will, if the feeling arm fails, protect the hull from contact with the ice above.

It is intended to provide a mechanical means of access to free air from under even twenty feet or more of ice. Two seven inch drills, one forward and one aft and operated from the inside of the vessel, can be used to drill through the ice. They will operate through a stuffing box as does the propeller shaft. The drills themselves will be cored—that is the centre section will be removable and when the hole is drilled the cores can be removed, leaving two six inch pipes projecting through the ice. These will serve as an intake and an exhaust for the engines. Lying peacefully beneath the ice, like a fly on a ceiling, it will be possible to recharge the batteries and proceed.

This, in fact, would be a safer method than coming up into an open lead. It may be thought that a submarine is "blind" when submerged, but experience has shown that in clear water—in the arctic the water is exceptionally clear—it is possible in daylight to see through the water for a distance of fifty yards or more. During the summer in the arctic it is daylight the whole season long; the sun at that time in those latitudes is never below the horizon. Even so, as a precaution, a highly penetrating concentrated light will be thrown forward and up-

ANY BOY CAN WIN THESE PRIZES

Here are just a few of the attractive prizes selected from our Prize Book containing over 300 articles. You can easily have these and many more prizes . . . and besides earn your own spending money. Thousands of boys who are members of The Crowell Club of Junior Salesmen are doing this regularly. You are missing the time of your life if you don't get in with these fellows who spend part of their spare time delivering The American Magazine, Woman's Home Companion and Collier's The National Weekly to regular customers

Here's smiling Bernard Korn, Ohio, with a few of the prizes he has won How would you like to be as lucky as Bernard to have a good looking bicycle . . . a fine chest of tools . . a football baseball glove . . and a handsome set of silverware for Mother? Bernard will tell you that it's as easy as fun winning these prizes

You Need No Experience to Start

If you want to win worth-while prizes, such as these shown, hurry and send your name and address on the coupon below. We will then start you as a Crowell Junior Salesman and tell you about the methods hundreds of boys are using to earn money and prizes.

SEND THIS COUPON NOW!

Mr Jim Thayer, Dept 183
THE CROWELL PUBLISHING CO.
Springfield, Ohio

Dear Jim I want to earn money and prizes Please start me off as a salesman

My Name _____

Address _____

Town _____ State _____

Bigger Pay

Thru Traffic Management

Mendel A Keith, of Columbus, Ohio—who for a number of years had been employed by the Pennsylvania Railroad—had been many kinds of a clerk. Much "experience" but little progress.

Then one day he woke up to his need for specialized knowledge in some important and profitable business field. He enrolled with LaSalle for home-study training in Traffic Management.

Today, Mr. Keith is Traffic Manager of the International Derrick and Equipment Company—at a salary many times his highest expectations as a clerk—is a member of the Transportation Committee of the Chamber of Commerce of Columbus, Ohio—and is regarded in the profession as one of the ablest traffic men in his territory. He is out of the rut and on his way to a very substantial future.

He won his advancement by saving thousands of dollars for his firm thru the obtaining of more favorable freight rates on shipments to western points.

Send for Free Book—
"Opportunities in Traffic Management"

What is it about Traffic Management as a profession that affords such golden opportunity? That question is simply answered—*Traffic Management affords a man unusual opportunity to show results.*

The coupon will bring you, without obligation, a 96-page book that points the way to the big rewards in Traffic Management and shows you how, within a comparatively few months, you can equip yourself to take advantage of them. LaSalle will send it to you FREE.

If you are eager to enter a field of unlimited opportunity, clip and mail the coupon—NOW.

— — — *Find Yourself Thru LaSalle* — — —

LASALLE EXTENSION UNIVERSITY
The World's Largest Business Training Institution

Dept. 8493-TR **Chicago**

I would welcome copy of "Opportunities in Traffic Management" also a copy of "Ten Years' Promotion in One," all without obligation.

☐**Traffic Management**—
Foreign and Domestic: Training for positions as Railroad or Industrial Traffic Manager, Rate Expert, Freight Solicitor, etc

Other LaSalle Opportunities

LaSalle opens the way to success in every important field of business. If more interested in one of the fields indicated below, check here:

☐Higher Accountancy	☐Modern Business Correspondence
☐Business Management	☐Stenography
☐Modern Salesmanship	☐Modern Foremanship
☐Railway Station Management	☐Personnel Management
☐Law—Degree of LL.B.	☐Expert Bookkeeping
☐Commercial Law	☐C. P. A. Coaching
☐Industrial Management	☐Business English
☐Factory Management	☐Commercial Spanish
☐Banking and Finance	☐Effective Speaking
	☐Stenotypy

Name .....

Present Position. .....

Address .....

Under the Pole in a Submarine

ward from the vessel and so enable the operator to observe the nature of things in the near vicinity.

Apart from the economic value of demonstrating the possible use of commercial submarines in arctic waters, the trip under the north pole and across the Arctic ocean will afford the maximum opportunity for carrying out scientific investigations of great importance. Instruments for finding the depths by sound and manual sounding machines will be carried. These will afford protection from running aground in shallow water. The submarine also has wheels on its bottom. A pendulum apparatus can be operated as the vessel is in motion and the specific gravity of the earth's crust at its upper end be recorded.

To Solve Scientific Mysteries

A gyro compass will give us some valuable information as to the magnetic differences as we cross the top of the world, far north of the magnetic pole itself. The earth inductor compass and the ordinary ship's compass will serve for navigation if necessary. We can observe the direction, force, temperature and content of the currents in the Arctic ocean and collect such biological life as may be found. Who knows what weird creatures may exist beneath that blanket of arctic ice? It will be possible to observe and photograph the life through the clear glass windows of the submarine.

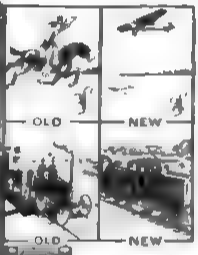
During periods of rest and while recharging batteries we can fix our position by astronomical methods and be in touch daily by wireless with all parts of the world. From a captive balloon we can photograph conditions below. There are few troublesome fogs in late summer such as there are in the arctic spring. It is even possible that we might broadcast speech from beneath the arctic sea to Commander Byrd on top of the antarctic continent. We can observe the midsummer ice and weather conditions and furnish information of extreme value to weather forecasters. But best of all we can demonstrate that the mechanical ingenuity of man has overcome another of the difficulties imposed by nature upon him.

Profitable Reading:—Modern Mechanics' Classified Ads!

Motion Pictures Train You QUICKER

THE NEW WAY

For a BIG-PAY JOB in ELECTRICITY



NOW—it's easy to get a better job with bigger pay—to get ahead—to save money—to become independent.

Everybody agrees that the field of ELECTRICITY is where the real opportunities are today and will be for years to come. And here is an amazing new way to sure success in ELECTRICITY. It will startle you with its improvement over old methods.

Now you learn from MOTION PICTURES right in your own home. You get a $75 DeVry motion picture machine without extra cost. You are furnished thousands of feet of film. You watch the motion pictures. You see giant dynamos in operation, moving diagrams, trained men at actual electrical work. It's so plain and easy anyone can understand. What your eye sees your mind remembers. It's just as easy as it sounds. Students everywhere are enthusiastic. You will be too. So lose no time in finding out all about this newest, quickest, easiest way to train for a big-money job.

Make $60 to $150 a Week

Thousands of trained men are needed in the electrical field. Demand exceeds supply. $60.00 to $150.00 or more per week is common. You can get in on this big money. You take no risk. We guarantee in writing to give you the training and employment service necessary to get a better job at bigger pay or you need not pay a cent.

Write Now for Big FREE Book It costs you nothing to get all the facts on this remarkable new MOTION PICTURE method. Our big FREE Book, The Film Way to Bigger Pay, tells you just how we train you for a bigger job. Send for it today. Find out how easy it now is to qualify for the big money. Mail coupon and get the facts.

The NEW WAY *Is the Best Way*

Just as the giant electric locomotives of today are superior to the first wheezy old steam engines. As the 150 mile an hour monoplane is swifter than the Pony Express. So is our new MOTION PICTURE electric training quicker, better and easier than the old hard to learn book methods. E. A. B., Brooklyn, N. Y., says "I finished Reel Lesson No. 3 today and certainly can understand now why you claim your course is so easy to learn. The films make it easy to grasp any point."

TAKE THE FILM WAY TO BIGGER PAY

The NATIONAL SCHOOL of VISUAL EDUCATION

"The Film Way to Bigger Pay"

537 S. Dearborn Street, Chicago, U. S. A. Dept. 8-L

Send book, "The Film Way to Bigger Pay," with facts about this new, easier way to master electricity.

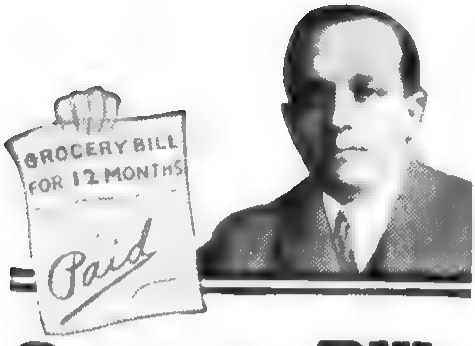
Name.....Age.....

St. or R. F. D.....

City.....

State.....

Mail this Coupon



Grocery Bills all Paid—and $10 a Day besides

If you want plenty of money to pay all your grocery bills—and $8 to $10 in a day besides—just send me your name and I'll show you a new, easy way to get it. I'll give you the same chance I gave to Van Allen, of Illinois, who reports that he averages more than $100 profit a week. You don't need any experience. G. Karnath, of Minnesota, writes, "Made $20.35 the first 5 hours." Mrs. Hodges, of New York, says, "Never fail to make a profit of $18 to $20 a day." And right now I offer you the same opportunity I gave these people.

Big Profits for Easy Work

I am President of a million dollar Company. I distribute high-quality Groceries and other Household Necessities direct from factory to user through Authorized Local Representatives. Last year my customers bought fifteen million packages of my products. This put nearly *two million dollars in the pockets of my Representatives.* Now I invite you to share in these profits. I'll give you *exclusive* territory—help you make big money *from the very start.*

No Capital or Experience Needed

All you have to do is call on your friends and my established customers and take care of their orders. It is easy. I never sell to stores. *You alone get the profit on all orders from your territory.* YOU DON'T RISK A CENT. Keep your present job and start in spare time if you want to. *You have everything to gain—not a penny to lose.*

Don't send me any money—just mail the coupon. I'll send you my amazing new plan that offers plenty of money to pay all your grocery bills and $8 to $10 in a single day besides. And I will tell you how to get a newest model Ford Tudor Sedan without cost. Don't miss this opportunity. Mail coupon TODAY SURE.

MAIL THIS TODAY

Albert Mills, [illegible] American Products Co.,
1484 Monmouth Ave., Cincinnati, Ohio.

Tell me without cost or obligation about your wonderful new proposition that offers money to pay all my grocery bills and $8 to $10 in a day besides. Also explain your new Ford Offer.

Name

Address

[illegible]

Choosing Your Job

(Continued from page 119)

fabricating the product because the designer is not familiar with what wood can do under conditions of steaming, etc., such as are needed in the building of the boat. Without a doubt the better way is to learn the trade, no matter whether you intend to stay a boatbuilder or become a designer and a shop owner.

The work of the designer who has mastered the boatbuilder's trade is evident at a glance from his work. Sometimes it is rougher looking, but boatbuilders respect the designer's knowledge and the designer has the advantage in having his plans closely adhered to.

Any young man can enter the employ of some nearby boatbuilding shop, and in a short space of time, say six months, make himself so useful that he will be put to work with an old time boatbuilder. From that point on he should learn the game rapidly.

Technical schooling in Naval Architecture can be obtained at the University of Michigan, or the Massachusetts Institute of Technology, either of which are recognized as leaders in their line. The course requires four years' time, and prepares for all branches of boat and ship designing.

Recently, several high schools have realized the advantages to be gained in offering a course in boatbuilding, and in connection with this writing you will note the splendid new building erected as a boat shop by a Miami high school, where master boatbuilder T. F. Angerman under the supervision of Mr. Hiley, chairman of the local school board, is teaching boys the trade of boatbuilding.

Paper Covers for Onions

USING black asphalt roofing paper as a covering for his freshly planted onion crop, Raymond L. Dollings, Ohio truck gardener, expects to increase production 200 per cent this year. Only two inches on each side of the row of onions is left unprotected by the paper, which serves as a mulch, retaining moisture and hindering weed growth. The use of paper for this purpose is not a new idea. For years the growers of Hawaiian pineapple have used paper mulch, and it is now beginning to win favor with truck farmers.

Full Size 42-Piece Dinner Set Free

Don't Send a Penny. We Trust You! Mail Coupon Now!

Here is a set you will be proud of. Rose and Foliage pattern. Newest Colonial shape [illegible]. Just sell 12 large size bottles "SALUT D'AMOUR Perfume as illustrated below (*Giving away a Perfume Novelty Free with each bottle*, and remit per plan in Premium Catalog. Don't send a penny. We trust you. *Mail Coupon Now!*

TREVAUX PERFUME CO., *Dept.* A-45 CHICAGO

BIG MOVIE Machine Free!

SEND NO MONEY WE TRUST YOU

Shows Large Size on Screen

Operates on same principle as expensive professional models. It is equipped with imported double Cooper lens, uses regular size films as in big theatres. Very simple construction—all steel and heavily made. Complete outfit enough for full hours show including practice reel of Tom Mix film, etc. Send coupon for Initial 12 Bottles Salut D'Amour Perfume at 25c. We also send 12 Perfume Novelties which you give away FREE with each bottle and easy plans for obtaining Movie Machine.

Mail Coupon

TREVAUX PERFUME CO., *Dept.* A-45 CHICAGO

MA-MA DOLL

She can do almost anything a real live baby does. Is fully dressed as pictured. Given for selling only 12 Bottles Salut D'Amour Perfume at 25c each. Giving Perfume Novelty free with each bottle. Easiest plan ever offered. Trevaux's Salut D'Amour fastest seller today. See illustration near coupon — Biggest value ever. Send no money. Just fill out and mail coupon today.

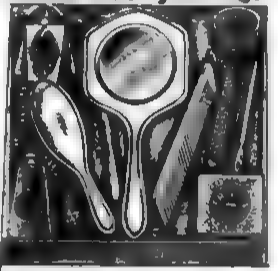
TREVAUX PERFUME CO., *Dept.* A-45 CHICAGO

GIVEN

This Ladies' or Girls' Watch is very dainty. Has fancy engravings front and back. Set with blue sapphire crown. —Jeweled Movement guaranteed 10 years. Send for 12 Large Bottles SALUT D'AMOUR Perfume which you sell at 25c each. We also send 12 Perfume Novelties which you GIVE AWAY Free and easy plans for obtaining this Wrist Watch. Don't send a penny. Mail Coupon now!

TREVAUX PERFUME CO.
DEPT. A-45 CHICAGO

10-Pc. Toilet Set - full size



This Ivory Finish Toilet Set consists of 10 FULL SIZE pieces. Biggest Value offered. Given for selling only 12 Large Bottles Salut D'Amour Perfume at 25c each. With each bottle you give away free a Perfume Novelty. Greatest value offered. We are big reliable company. Don't send a penny. We trust you. Mail coupon now. Trevaux Perfume Co. *Dept.* A-45 *Chicago*

High Grade Violin & Bow

FULL SIZE

Send No Money! We Trust You! The quality of this outfit will amaze you. Violin is made of selected woods, smooth round corners and full size. Send for 12 Bottles Salut D'Amour Perfume at 25c a Bottle. Give away Free Perfume Novelties. Select Violin per catalog plan. See coupon. TREVAUX Perfume Co., Dept. A-45

FREE COASTER WAGON GIVEN

This big wagon is 16x36 inches. Heaviest construction known. Best materials, hardest woods used. Roller bearing. Mail coupon today for Initial 12 Bottles Salut D'Amour Perfume which you sell at 25c each. We also send 12 Perfume Novelties which you give away Free, and easy plan for obtaining wagon. Send no money.

Heavy tires are double rim 16 inch steel wheels.

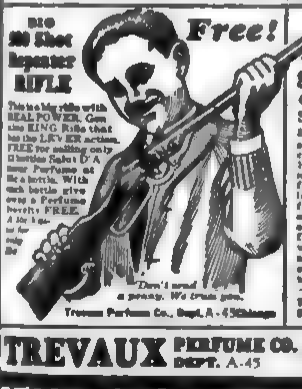
TREVAUX PERFUME CO.
Dept. A-45
CHICAGO

Here is what you Sell!—

We send 12 Bottles Salut D'Amour Perfume to be sold at 25c each (first time offered in America) We also send 12 Perfume Novelties which you give away FREE with Salut D'Amour Perfume. It makes easy sales for value for 25c. Help us ad vertise and introduce Salut D'Amour Perfume in your town by filling out coupon at right — This large size you sell at 25c.

Actual Size

BIG 200 Shot Repeater RIFLE Free!



This big rifle with REAL POWER. Genuine KING Rifle that has the LEVER action. FREE for selling only 12 bottles Salut D'Amour Perfume at 25c a bottle. With each bottle give away a Perfume Novelty FREE. A lot of fun for only 25c

Don't send a penny. We trust you.

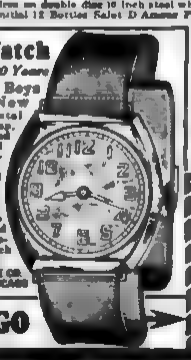
Trevaux Perfume Co., Dept. A-45 Chicago

Strap Watch

Guaranteed 10 Years

Suitable for Boys and Men. New shape, white metal case, leather strap. 10 year guaranteed movement. Send for 12 Bottles Salut D'Amour Perfume that you sell at 25c each. We also send 12 Perfume Novelties which you give away FREE, and easy plans for obtaining wrist watch —Send no money

TREVAUX PERFUME CO.
Dept. A-45 CHICAGO



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Send No Money

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TREVAUX PERFUME CO., A-45 CHICAGO

I want to help you introduce "Salut D'Amour" among my friends. Send me 12 Bottles to sell at 25c each. Also send 12 Perfume Novelties to give away free with "SALUT D'AMOUR. Will remit you within 30 days and select gift from Catalog sent with perfume according to offers.

Name.....

Address.....

City.....

State.....

Print or write name plainly and mail today!

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And you will not be satisfied unless you earn steady promotion. But are you prepared for the job ahead of you? Do you measure up to the standard that insures success? For a more responsible position a fairly good education is necessary. To write a sensible business letter, to prepare estimates, to figure cost and to compute interest, you must have a certain amount of preparation. All this you must be able to do before you will earn promotion.

Many business houses hire no men whose general knowledge is not equal to a high school course. Why? Because big business refuses to burden itself with men who are barred from promotion by the lack of elementary education.

Can You Qualify for a Better Position

We have a plan whereby you can. We can give you a complete but simplified high school course in two years, giving you all the essentials that form the foundation of practical business. It will prepare you to hold your own where competition is keen and exacting. Do not doubt your ability, but make up your mind to it and you will soon have the requirements that will bring you success and big money. YOU CAN DO IT.

Let us show you how to get on the road to success. It will not cost you a single working hour. Write today. It costs you nothing but a stamp.

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....Business Manager	....Steam Engineer
....Cert. Public Accountant	....Foremanship
....Accountant and Auditor	....Sanitary Engineer
....Bookkeeper	....Surveyor (& Mapping)
....Draftsman and Designer	....Telephone Engineer
....Electrical Engineer	....Telegraph Engineer
....Electric Light & Power	....High School Graduate
....General Education	....Wireless Radio
....Vocational Guidance	....Undecided

Name.....

Address.....

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Home Rug Making

By OLIVER S. ARATA

An opportunity for the housewife to turn spare time into money is afforded in the manufacture of hooked rugs, now enjoying a revival of their old-time popularity.

WOMEN who desire self-expression in a relatively new hobby may well turn their attention to the making of hooked rugs. The hooked rug is becoming more and more popular each day, and almost all

A popular design easily worked into a hooked rug is shown above.

department stores are featuring window exhibits on hooked rug making.

Just as in other works of art, the value of the finished product depends upon the particular interpretation of the theme chosen for a design and upon the skill in its execution. Hooked rugs, being a revived fad, are selling at prices ranging from $25 to $50, while really old hooked Colonial pieces are rare and are sought by wealthy buyers of antiques.

Women of Colonial days, who made these charming household tapestries, had to be content to cut up cloth into strips of equal length, dye it various colors, then wind it into large balls, after which they fabricated their rugs by slow degrees, using awkward methods requiring much patience.

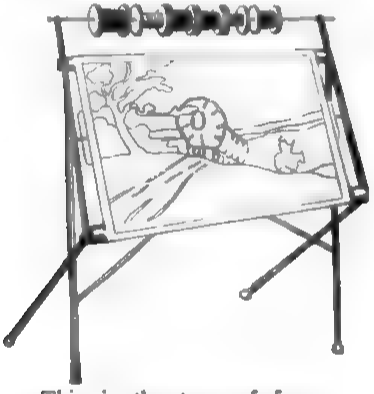
Today, in the methods advocated by the department store sellers of materials for making hooked rugs, this is all eliminated. The pattern is stretched on a strong and light

is a Paying Hobby

metal frame which supports two wooden rolls. Being adjustable, the frame can be swung to any position for comfortable working. No tacks or hooks are used in securing the pattern and it may be mounted on the frame in many odd shapes.

In some cases the making of hooked rugs has proved a practical and profitable occupation, as the rugs are readily sold, or put on display in local stores for sale. The retail value, according to city is from $25 to $50. They can be made for about $6, allowing a nice profit for the time spent in making them. The needlework frame outfits, including the special needle which does the hooking, sell for about $8.00, so it is not difficult to establish a profitable "home industry."

Patterns, stamped in burlap, come in a wide variety of subjects, such as camels



This is the type of frame used in making hooked rugs.

crossing the desert, ships, and other things of interest. Colors may be worked in to suit individual tastes, and there is a wide field for those who seek self expression in this new hobby of hooked rug making.

Although at first the process of fabricating hooked rugs may seem tedious, the knack is soon acquired and with the increase of individual skill the art becomes constantly more fascinating. For women looking for pleasant means of making "pin money"—especially for those with an artistic bent—the making of hooked rugs will be an appealing avocation.

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Streamline plane developed by World War Aviator to rise off ground and ... Hundreds of flights. Proud purchasers say performs as ... Stout rubber ... resembles original in every detail even to "Lone Eagle" at cockpit. ... 15-foot Mitsubishi wing and 12-inch fuselage withstand any ... Finished in BRILLIANT SILVER DOPE. ... Weighs 1½ oz. Stands ... soaring ... out of doors ... fun ... could ... fly ... Includes ... propeller ... on wood strut ... wing ... bent ... tions, all complete, postpaid U. S., $1. Canada, $1.20.

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Gentlemen: I enclose $.....for which send me, right away, Model Kits I have checked below

☐ Spirit of St. Louis $1 ☐ Fairchild Cabin $2
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$90 WEEKLY IN SPARE TIME!

Men, here is a wonder—the most sensational invention of the age! If you're looking for a rapid fire seller, an item that nets you 100% profit an item that sells itself to 7 out of 10 men on demonstration I've got it in Ve Po Ad, the amazing new vest pocket adding machine!

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This most remarkable invention does all the work of a $300 adding machine yet fits the vest pocket and sells for only $2.95! It sells on sight to storekeepers, business men, and everyone who uses figures—and makes you over 100% profit on every sale! Ve Po Ad does any kind of figuring in a jiffy, yet weighs but 4 oz. Counts up to a billion. Shows total at all times. Perfectly accurate. Lightning fast. Never makes a mistake or gets out of order. Over 100,000 in daily use!

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Live wire salesmen are dropping everything else and flocking to Ve Po Ad. Ve Po Ad brings them quick money and lots of it. Shapiro put in California made $475 in one week! You can "clean up" too! Only 10 sales a day in spare time will bring YOU over $95.00 a week! You need no previous sales experience—Ve Po Ad sells itself! If you are really interested in earning a steady, substantial income, write at once for full details of my MONEY-MAKING PLAN and FREE VE-PO-AD given to new Agents. Do it NOW—TODAY!

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29 North Ave. New Rochelle, N. Y.

New Lights for Old

Erected on the island of Pharos where an ancient watch tower burned for 1700 years, a gigantic new beacon serves as a guide for sailors.

IF PTOLEMY II, ruler of Egypt, were on his throne at the present time, he would sooner or later look out over the Mediterranean and exclaim, "Well, well, if they haven't put up a brand new lighthouse right near where I built the first one on the island of Pharos."

It was nearly 300 years before the Christian era that this patriarch of lighthouses was built. It was about 100 feet high, and stood until the fourteenth century, when it was washed away by the sea. The light consisted of an open fire burning wood.

The new light that has just been installed has been erected on the top of the old tower foundation. The focal plane of the new light is 184 feet above sea level. This gives

Floating on mercury to eliminate friction, this huge lighthouse lamp makes two revolutions every minute. There are three panels of refractors and reflecting prisms.

a range of 24 miles for the beams. As an observer on the deck of a ship is above sea level, some portion of the beam is visible at a very much greater distance if the air is clear.

This great light was manufactured in Birmingham, England. The light proper is composed of three panels of refractors and reflecting prisms, each panel embracing a horizontal angle of 120 degrees. The whole system is rotated by clockwork at the rate of two revolutions per minute, and every 10 seconds it gives a flash of one-half second duration as the beams sweep round.

The light-giving portion is supported on an open frame-work carriage, below which is a U-shaped cast iron ring which is supported by mercury in a U-shaped trough. The floating apparatus weighs about 3.75 tons, and this is supported by 450 pounds of mercury. The effect of floating the light on mercury is to eliminate all friction.

Meteorite Stops in Australia

A METEORITE weighing 14,000 pounds was recently found in Australia. It is shown in the photo below being prepared for exhibition purposes in the Field Museum.

Geologists making a plaster cast of meteorite.

Expect Huge Strawberry Crop

WITH AN estimated crop of 5,495 carloads of strawberries, valued at $5,912,125, growers in the Ozark mountain regions are preparing to reap one of the greatest harvests in the history of the district.

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Here is a wonderful example of engineering ingenuity. A real gasoline engine that weighs only three pounds, yet develops ½ h.p. It is a 2 cycle, 3 port air cooled aluminum alloy engine with 1½" bore and 1¼" stroke. It is 6" high and 2¼" in outside diameter. This engine is perfected and is not an experiment.

9 Ft. Model Plane Flies One Mile

And climbs 300 feet when equipped with this motor. It has many uses such as running an ordinary canoe, small row boat and light motorcycles. It is just what model plane builders have been looking for. It is an engine that will make their models fly.

Send at once for complete information and Bulletin No. 45 which describes this motor.

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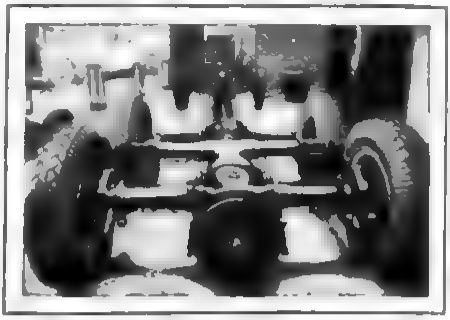
263 McGILL BUILDING, WASHINGTON, D. C.

Six-Wheeled Motorbus Chassis



Note the heavy construction of the axles and the absence of side members in this monster motorbus chassis.

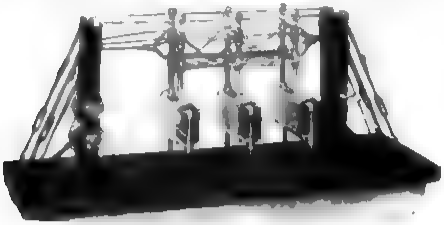
A PROPELLER shaft of the size used in seagoing vessels is employed in the giant motor bus chassis shown in the photo above. Instead of the usual two wheels and differential at the rear, this bus is equipped with four drive wheels which carry the heavy weight of the bus body and passenger load. A novel feature of construction lies in the placing of the brake drum at the extreme end of the drive shaft; it may be seen as the large circular drum in the central foreground of the picture. This single brake drum, by its unusual location, exerts a braking effect superior to that which would be effected by a drum on each wheel.

It will be observed that the chassis has no frame, in the generally accepted sense of the word, that is, there are no side members, the front and rear sections being supported only by the drive shaft housing. This fact makes the chassis remarkably flexible, the wheels accommodating themselves easily to uneven roadways. The front wheels are mounted on an independent axis and the motor is protected from road shocks by hydraulic absorbers. Brake rods may be seen running along the side of the drive shaft. The length of the chassis is almost as long as the average street car.

YOU Can get in touch with Mechanics throughout the World by inserting a few lines in the *Classified Ad* section of Modern Mechanics and Inventions magazine, Minneapolis, Minn., U. S. A.

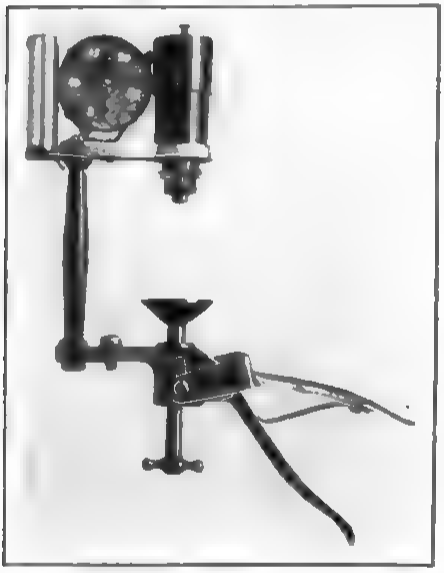
New Race-Starting Gate

ALTHOUGH the device in the photograph looks like a new style suspension bridge, it is really a new style gate



for starting horse races. The racers are lined up in the stalls, the signal given, and away they go.

Fruit-Testing Device



THE well-known fact that a green apple is harder than a ripe one was utilized by Dr. A. E. Murneek, assistant professor of horticulture at the University of Missouri, in perfecting the instrument shown above, which tests the ripeness of deciduous fruits by registering the pressure required to burst through the skin. The apparatus is known as a "pressure tester" and supplants the human thumb in determining whether fruit is too ripe to be packed tightly in barrels, or whether it is too green to be picked from the tree.

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Here is a pleasant, easy way to make BIG MONEY in a CASH BUSINESS of your own. Very little money required to start—no stock to carry—NO CANVASSING. Start in spare time and build a PERMANENT, SUCCESSFUL BUSINESS filing saws on the Foley Automatic Saw Filer.

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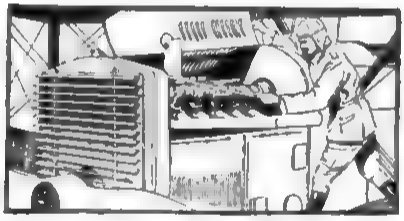

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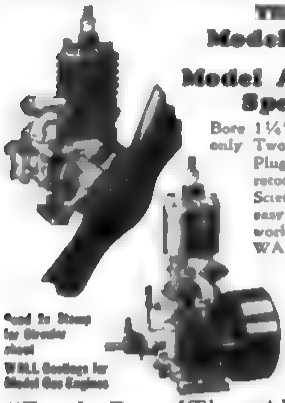

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More Letters

THE EDITORS of the Shop Mail Box are in receipt of a letter concerning the new Alco Sportplane, advertised in MODERN MECHANICS. This is slightly different from the ship recently run as a how-to-build article in the magazine. In Mr. Allison's own words:

. . . This varies from the design in M.M. in several places. We have put curves on the tail surfaces and used a split type landing gear. The motor is a small German 3 cylinder of 150 cu. in. displacement. The propeller is the Lawrence 28 HP 2 cylinder type. We use it on everything from a Ford motor to a 6 cylinder Anzani. I am sorry to have bad news for the boys about the price of the motor. It costs over $700. We have no more 2 cylinder Lawrence 28 HP motors and in the next ships will use the 7 cylinder rotary Gnome of 50 HP. There are a few of these available for a little more than the price of a 2 cylinder Lawrence. The plane is not strong enough to carry the 80 HP LeRhone, the 100 HP Gnome, etc.

Yours truly,

L. M. ALLISON.

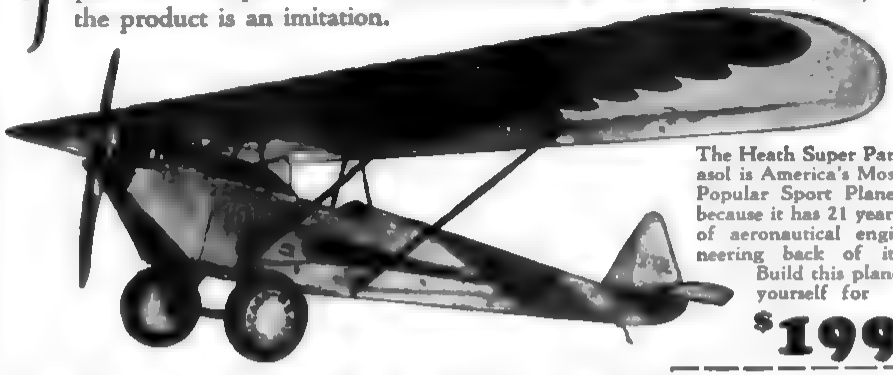
In the words of the late Vice President, Mr. Marshall, who said "what this country needs is a good five cent cigar," we echo with the phrase "what this country needs is a good cheap light airplane motor."

Seven hundred dollars for a foreign motor is higher than most of us can aspire. The old Gnomes gave good service to pioneers, and possibly if the motor mount was made strongly enough the light planes published in the magazine could be used. In the Gnome the cylinders rotate the prop. The crank is stationary.

CONCERNING another of the M. M. famous how-to-builds, catch a glimpse of the photos on page 180 showing Weston Farmer's *Humpty Dumpty* under sail. The topsail and the foresail of the cutter rig which was shown have been left off, and the jib and main of the sloop rig give a rope or two less to handle.

The boat is a perfect little success, sailing well on all points. Note the seagoin' mess of gear on her deck. Can you see the block holding the heel of the mast? You will remember the mast was stepped on deck, contrary to the general practice of running it through the deck to bury on the keel.

IMITATION is the sincerest form of flattery. But the customer who purchases the product of the imitator soon learns, to his sorrow, why the product is an imitation.



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Or fly it away at our Airport for $975. 10c in stamps or coin brings you our large booklet full of rich information about this wonder plane. $5 brings our detailed shop blue-prints, the most complete ever published.

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Don't Let $1.00 Stand Between You And A Good Head Of Hair

For years I suffered from dandruff and falling hair, until a friend told me an old Canadian method. This treatment will stop falling hair, eradicate dandruff and grow new hair. My baldness has been replaced with luxuriant new hair. Dozens of my friends have had equal results. The method is simple, easy and positive. Send me $1.00 to cover costs and I will mail you this prescription and method of treatment with my positive guarantee that you will be satisfied or I will return your money. A few cents at any drugstore buys the necessary ingredients. You will thank me many times, as my friends have for telling this method which has succeeded where everything else has failed. $1.00 only, and your hair trouble is solved for the rest of your life.

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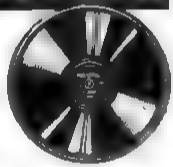

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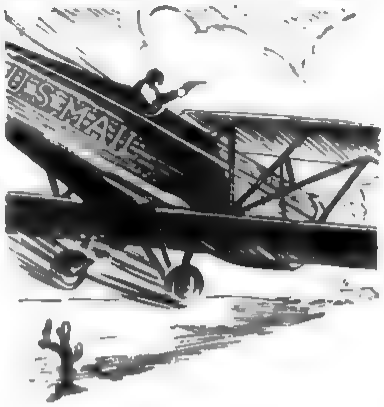


Sewell Peaslee Wright tells about a cowboy who stumbles into a death mystery in

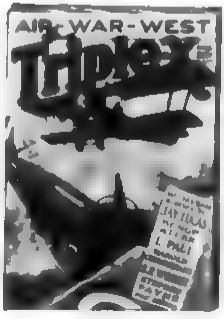
Murder in the Cockpit

which appears in the

AUGUST

Triple-X

Jay Lucas, Benge Atlee, L. Paul, Harold Cruickshank and others contribute to the same issue.



Mail $1 (bill or stamps) and TRIPLE-X will be mailed you for the next five months. Address: TRIPLE-X Magazine, Fawcett Publications, Inc., Minneapolis, Minn.

August Issue Now on Sale

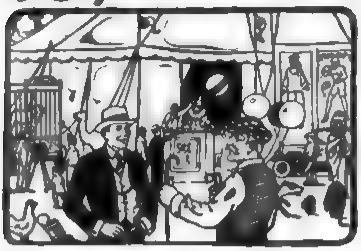
More Letters From Shop Mail Box

Here is Humpty Dumpty, built from plans which appeared in Modern Mechanics. The little toy-boat has proved safe and able, giving her owner lots of fun.

This method of mounting the mast has proved very satisfactory so far. If you will look closely at the photo showing her gear you will see the forestay turnbuckle which holds the plowsteel rigging taut. The stays stretch quite a bit, and twice in two weeks, after sailing in hard blows, they had to be completely taken up. Stranded wire cable *does* stretch!

Snapshot of forward deck of Humpty Dumpty.

$5,000.00 Worth of Prizes



I am going to give away, absolutely free, an 8 cyl. Studebaker Sedan to someone who answers this ad. It will be delivered thru the nearest Studebaker dealer, or winner may have its full value in cash, $2,230.00. This offer is open to anyone in the U. S., outside of Chicago, and is backed by a Big Reliable Company, which has already given away thousands of dollars in cash and prizes to advertise its business.

Solve This Puzzle

There are many objects in the picture of the circus above. See if you can find 5 that start with the letter "C." When you do this, write them on a piece of paper together with your name and address and send it to me right away.

$550.00 Given for Promptness

I am also giving away a Chevrolet Sedan; Victrola; Shetland Pony; Seven Tube Radio; Gold Watches and many other valuable prizes and Hundreds of Dollars in Cash, including $550.00 for promptness. First prize winner will receive the Studebaker Sedan and $550.00 cash, or $2,800.00 cash. In case of ties duplicate prizes will be awarded. Find 5 objects in the picture above starting with the letter "C" and send them to me right away with your name and address plainly written. $5,000.00 worth of prizes. Everybody rewarded.

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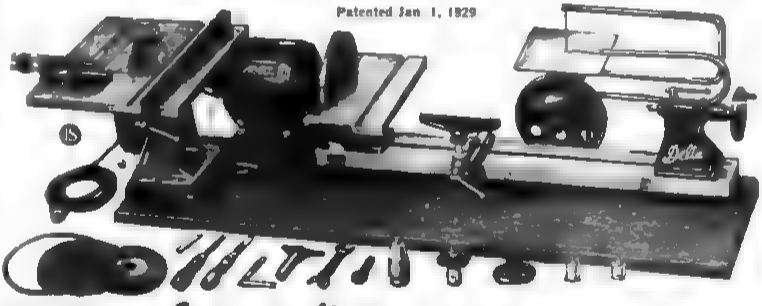

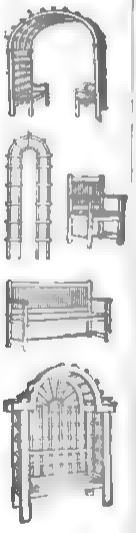

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Do your woodworking quickly, easily with this man-sized, motorized workshop. Efficient, practical in design. Equipped with powerful two-shaft motor that permits carrying of two or three important operations at one time. Numerous other exclusive features that practical craftsmen appreciate. Complete "Delta" Handi-Shop includes all necessary equipment for Circular Sawing, Wood Turning, Scroll Sawing, Sanding, Drilling, Grinding and Buffing. Full instructions and complete set of working blue-prints furnished.

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$1 We will be glad to furnish our complete set of 10 Working Blue-prints of Summer Furniture separately, upon receipt of $1.00

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Without obligation, you can test the Handi-Shop under actual working conditions for 10 days in your own home. Send at once for FREE illustrated literature giving complete description of the new 1929 Model "Delta" Handi-Shop, and full details of 10-Day Trial Offer and Easy Payment Plans.

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☐ I enclose $1.00 for set of Blue prints of Summer Furniture.

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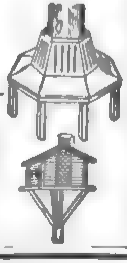

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Has wing spread 16" with main fuselage 11", 2" carved wood propeller, 6 ply rubber motor. Soars to great heights. Completely assembled. Simply fasten wings and launch. Only 50c. Junior model—11" wing spread, 9" motor stick, 4 ply rubber motor, 25c. Both models guaranteed to fly. Special Pure Para rubber 1/8" flat 1/2c foot, 3/16" flat 1c foot. Postage and orders 5c extra. Send 2c stamp for Price List.

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More Letters From Shop Mail Box

AMONG the how-to-build fans the Russell sportplane article still holds high interest. Witness this letter from Mr. K. E. Davis, head of the Science Department, Oceanside Public Schools, Oceanside, N. Y.

Gentlemen:

We have purchased several sets of blueprints and so-called instruction forms for the building of a light sport airplane. We have paid all the way from fifty cents to five dollars for them. But we have found nothing quite so complete and which fits so well into the theory (as investigated in this school from bulletins and Technical Memos. of the N.A.C.A.) as the article, by Charles E. Russell, in the April issue of Modern Mechanics.

It is the desire of the Science, Manual Training and Math. departments of this school to join forces in the design and building of the Russell plane as a project lesson to extend over an entire school year. Therefore we would like to know if you maintain an information department from which we may secure information relative to things which may not be entirely clear to us.

In your honest opinion, can this plane be built in the average High School Manual Training shop having band saw, circular saw, edger and lathe? If so, can it be expected to behave well in the hands of an experienced pilot?

This school is located about nine miles from Curtiss Field, and so aviation interest runs high among students. For this reason students collect a good deal of "advice" from pilots. This "advice" is not always favorable to the small plane or amateur building.

You will appreciate that such a project lesson must be a success in order to be worth while.

Very truly,
KIRKE E. DAVIS.

We wrote Mr. Davis, reassuring him that his school would find it most practicable to build the plane. In fact several other manual training departments of other public schools are building the Russell or the Heath planes.

Pilots of commercial planes are used to flying high powered ships and for that reason are apt to deprecate the low power of the light plane. What they do not think about, however, is that the weight per horsepower is the same for the light plane as for the large plane. Every horsepower of the large plane is carrying as much weight as the horsepower of the light plane. Therefore performances and safety as re-

More Letters From Shop Mail Box

gards flight should be the same, assuming an engine which is reliable in running.

The letter below, from the Montreal Flying Club, per E. J. Dechaux, is self explanatory. We publish it verbatim:

Dear Sirs:

I'm writing you to give you an idea how we like your magazine. To our estimation it is the best book on modern mechanics that we have come across. It is not cut and dried like most books, but interesting and educational.

The book has come out with some interesting plans which have helped us in making masterpieces. The aviation section being the first in consideration. How are the plans for the "Flying Bath-tub" coming out?

We agree with one of your readers that the magazine should not contain fiction but instead that this space be filled in with model plans, or more airplane designs, as these are the subjects that make your magazine attractive.

The boys out here are aching to have plans to make cut-down roadsters and racers using motorcycle or old Ford engines, so we would like to know if any plans have been submitted or if any are going to come out in the near future.

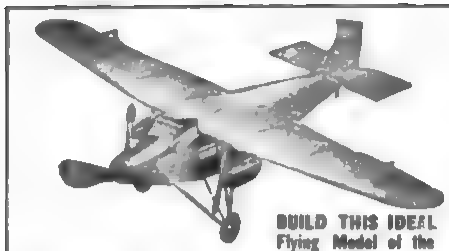
Yours truly,
THE CLUB
Per E. J. Dechaux.

In answer to Mr. Dechaux' letter we wrote that the plans for the Flying Bath-tub have not been completed, and that we have several authors working on plans for the souped up race cars. Editors are somewhat at the mercy of writers who promise that they will have their stories done for certain, and then fail to deliver—so all we can say is, "Be patient, Gang! The cargo is on the way—each month brings a little more!"

Yes! Include Blue-prints

ALONG with a renewal subscription to MODERN MECHANICS, James E. McCormack of Haliburton, Ontario, accompanied these thoughts:

Blue-prints in Modern Mechanics? Sure, when illustrating articles, they make them more complete. Besides, not many of us know where to locate the right prints, and if we did, they would probably cost us many times the price of your magazine. When they are included, we get them for 25 cents and the rest of the magazine free, or else



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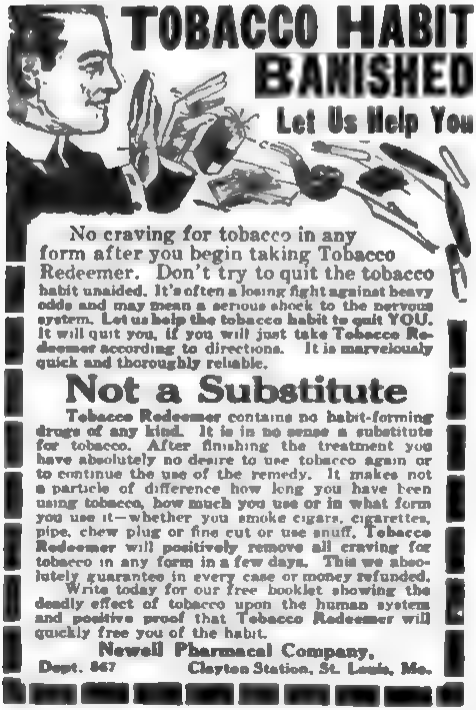

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Write today for our free booklet showing the deadly effect of tobacco upon the human system and positive proof that Tobacco Redeemer will quickly free you of the habit.

Newell Pharmacal Company,
Dept. 847 Clayton Station, St. Louis, Mo.

More Letters From Shop Mail Box

we get them free and the remainder of the magazine for our money.

News? Yes, as long as it is the latest in mechanical stunts. Contests? You bet! They add a lot of interest and are also educational.

In fact, the only fault I have to find with Modern Mechanics is the way it makes me pry myself loose from the price—and all just because an ex-war pilot knows how to make the magazine so darned interesting. If Captain Roscoe Fawcett didn't do that—well, I'm of Scotch descent, and could hang onto my money very easily instead of spending it that way.

JAMES E. McCORMACK.

The editors believe that Mr. McCormack has the right slant on blueprints. If the average person interested in building planes, boats, engines, etc., did know where he could obtain complete plans, he would undoubtedly have to pay a good sized sum, depending on the nature and complexity of the prints.

Plans Would Have Saved $500

"IF I COULD have had the plans for the Russell Monoplane that were published in the April issue of MODERN MECHANICS before I attempted to build a plane of another design," writes a man from Ada, Oklahoma, "they would have saved me $500!"

His letter continues:

After reading the article and plans for Mr. Russell's plane, all I have to say is that they surpass anything I have ever seen published. I built, or rather tried to build a plane of my own, and it has taken me two years to make it fly. Even now it is not air-worthy—and how expensive it was!

I have checked the Russell plans very carefully and can find no discrepancies, except which wing curve is used, the Y or Y-15? Wish you would have published your magazine and the plans sooner!

Yours truly,
C. G. WILLIAMSON

As was explained in the forepart of this Shop Mailbox, the Clark Y wing curve was published in error instead of the Clark Y-15.

A Model Radio-controlled Plane

CONCERNING the request in a recent Shop Mailbox of T. A. Price for a model airplane that could be controlled by

More Letters From Shop Mail Box

radio, Edgar Seymour (no address) writes that he'd "like to stimulate the editors to get their thinking caps on and get busy on this."

He also says:

I have read almost every issue of your magazine. I can't help it. At present I'm building the Northrop glider, following the plans as printed in the June issue, and am going to learn to fly that way. Then I'm going to build the Heath airplane from the plans that you published in January, February and March. Great program, if it works out, isn't it?

Now, let's see the plans for that radio-controlled model plane.

Yours very truly,

EDGAR SEYMOUR

We took Mr. Seymour's advice, and applied our thinking caps to this subject. However, before we could get well started, we were informed by our Radio Editor, Charles Magee Adams, that such a thing would be in direct violation of the rules set down by the Radio Commission. We must therefore let this pass. Sorry.

That will be a great program to follow! Stick to it, Mr. Seymour.

Modern Mechanics on sale at all newsstands the first of every month.

Real Airplane Wood (BALSA)

for Your Model Plane

Lighter weight airplane wood will make your model airplane fly better. Cut in all sizes ready for building. Send 10c for illustrated booklet explaining all details on model airplane constructions, also for interesting information on the wonderful Balsa Wood and supplies for model airplane building. Write us today—don't delay.

Hawk Model Aeroplane Co.

DEPT. 10

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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

"14 WORDS OF MAGIC POWER FREE —that is what the multi-millionaire gave to the young man who saved his life. 14 WORDS that created the rich man's millions. The young man used them. They made him worth a quarter of a million dollars in 5 years. Do you want to know what these words were—and how you can use them? A fascinating little book tells the story. It is yours free IF you are a young man 16 to 32 years of age and willing to consider using a part of your spare time preparing for a worthwhile position in the big pay fields of Drafting, Engineering, Electricity or Architecture through any one of these three plans:

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Only 4 Motions used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

Play in Half Hour
After you get the four easy motions you play harmonious chords with very little practice. No previous musical knowledge needed.

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GIVEN *when you enroll* —a sweet toned **HAWAIIAN GUITAR, Carrying Case and Playing Outfit—Value $18 to $20**
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8th Floor, Woolworth Bldg., Dept. 686. New York, N. Y.
Approved as a Correspondence School Under the Laws of the State of New York. Member National Home Study Council

$25.00 DRAWING COURSE for $2.98

Haven't you often wished that you could draw cartoons, illustrate some jokes, sketch some pretty face, etc.? You can do all of these things. One of America's most famous cartoonists and illustrators has developed a great simple system for success in all branches of Commercial Art. This system has revolutionized the entire theory of drawing. It means that drawing can be as easy for you as writing—much simpler than learning shorthand, bookkeeping or typewriting. We are now placing this original system for learning Drawing, Art and Cartooning, consisting of 31 lessons with over 500 Illustrations within reach of every one. If you will devote a few hours each week to the Course WE ABSOLUTELY GUARANTEE that you will learn to draw and draw well before you have half finished the Course or we fail to make this claim good, we will refund every cent paid us. By eliminating a large office force for answering correspondence, expensive catalogs, etc., we are enabled to make a price of $2.98, the cheapest price ever known for a high grade home study course. Many have sent us letters similar to that of Rob't P. Davis of Detroit, who wrote:

"I can't see how you ask so little. It is more than I expected." Learn to draw. It is a big asset, no matter what field you are in.

SEND NO MONEY

Just order the course and on arrival pay postman **$2.98** plus a few cents postage, payment in full for the entire Course and Drawing Outfit. If not entirely satisfied return within five days and we will Refund Money. Address:

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Dept. 774-A, Chattanooga, Tenn.

Orders from outside the U. S. A. are payable $3.20 cash with order.

Free If you order the Course at once we will include a drawing outfit consisting of artists pencils pens paper erasers thumb tacks etc. enabling you to go to work without any additional cost.

More Letters From Shop Mail Box

Explaining the "Drunken Eclipse"

READERS of the Amateur Cameraman department in our June issue will recall the photos of an eclipse, taken by Mr. Kerst, the department editor, which were streaked as if the plates had been exposed to a lightning flash. Unable to explain the cause of the streaks of light which staggered over the face of the photo, Mr. Kerst appended the whimsical title of "The Mystery of the Drunken Eclipse" to the picture and published it in his department with a request that readers who could explain the phenomenon send in their explanations to him. The first to respond with a solution of the mystery was I. L. Sears, whose letter and explanation appear below:

Dear Editor:

I offer this explanation for the "Drunken Eclipse" picture printed in your June issue:

I do not know how the Speed Graphic shutter works, but it may have become afflicted as did a shutter that I used several years ago. The shutter was mechanically perfect (I communicated with the makers) but once in a while the pictures were pure freaks. A picture taken on a bright day outside, would look as if taken in a Texas sand storm. Some plates had marks like spirit shorthand.

One day I was making another examination of the lens and shutter, holding them between me and the disc of the sun. I had the shutter closed when I took the first look. The sun was showing through that vulcanized shutter leaf as a disc of the most beautiful purple! The whole of the shutter was a clear lavender color. Then I knew that the shutter leaves had in some way become more or less transparent to strong actinic rays. Maybe oil vapor had been absorbed by the rubber and ruined its opaqueness. A change of shutter corrected all.

Maybe in the case of the Eclipse picture, the camera was pointed toward some strong light that was capable of penetrating hard rubber in a degree to affect the plate.

It may be that the eclipse shadow cut off some rays from the sun that ordinarily blanketed actinic rays; and the unhampered rays were capable of penetrating the usually opaque hard rubber shutter. That idea would require movement of the camera when pointed toward the sun while the eclipse was in progress.

I. L. SEARS.

1604 Hunter Street,
Sullivan, Illinois.

Mr. Sears' explanation seems to be reasonable enough, and the Editors compliment him on his sleuthing ability in solving the mystery.

CLASSIFIED ADS.

Rates for classified advertising, 15 cents per word, minimum 10 words. Cash should accompany order. Closing date, 20th of third month preceding date of issue. Address communications to Advertising Department, Modern Mechanics, Robbinsdale, Minn.

AVIATION

Heath Parasol fuselages $27; tail groups, $30; prints, $5.00 to $15.00. Everything assembled. Marsh & Cendt Airplane Co., Cudahy, Wisconsin.

SIMPLEX AIR MODEL CO., Auburn, Mass. Send five cents for our Model Builders catalogue.

Glider flight plane builders. Success depends on wing shape. Blueprints of best wing section 75c. Eaglehawk Engineers, Plymouth Bldg., Minneapolis, Minn.

AGENTS

Sell By Mail! Books, Novelties, Bargains! Large Profits! Particulars FREE! C. Elfco, 525 South Dearborn, Chicago.

Agents—I'll pay you $12 daily to wear fine Felt Hats and show them to friends. Smartest styles. Latest shades. $2 to $5 saving on every hat. Samples FREE. Write Taylor Hats, Dept. 14-100, Cincinnati, Ohio.

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DETECTIVES EARN BIG MONEY. Excellent opportunity. Experience unnecessary. Particulars free. Write George Wagner, 1290-V Broadway, N. Y.

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Submit Your Song Poem or Complete Song. Will return it immediately if not accepted! Chester Eicher, Music Publisher, 125 West 45th St., New York, N. Y.

Songwriters—Successful songs, earn fortunes; submit poems, Brennen, Song Specialist, T1005, Broadway, New York.

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INVENTIONS COMMERCIALIZED. Patented or unpatented. Write, Adam Fisher Mfg. Co., 562 Enright, St. Louis, Mo.

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Learn how to keep your mind on one subject despite interruptions. Great possibilities through thought control. Companion book, "How to Conquer Fear," shows how to avoid worry, fear, doubt, anxiety, strain, nervousness, self-consciousness and gain contentment. Both wonderful books by F. W. Sears, M. P. $1 postpaid, or C. O. D. to any U. S. Post Office. You pay postman price plus postage. Satisfaction or money back.
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CORRECT Your NOSE

to perfect shape while you sleep. Improve your entire appearance. Anita Nose Adjuster guarantees SAFE rapid permanent results. Painless. Age doesn't matter. 60,000 doctors and users praise it. Gold Medal Winner. Write for FREE Booklet and 30-Day Trial Offer.
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Or Snuff Habit Cured Or No Pay

Superba Tobacco Remedy destroys all craving for Cigarettes, Cigars, Pipe, Chewing or Snuff. Original and only remedy of its kind. Used by over 500,000 Men and Women. Perfectly harmless. Full treatment sent on trial. Costs $1.50 if it cures. Costs nothing if it fails. Write today for complete treatment.
SUPERBA CO. M-33 BALTIMORE, MD.

This Man Made $517.00 in 3 Weeks!

W. V. JONES, Texas

OVER $170.00 weekly profit is averaged by W. V. Jones. W. D. Fauley, W. Va., earned $257.00 in 21 days. Shedrick, of Ohio, cleaned up $177 in 4 days. These are typical examples of earnings with this most amazing, gorgeous and beautiful line of electric signs. No experience is needed to take orders for the new kind of

Dazzler and Rainbow Glow ELECTRIC SIGNS

Attractive, colorful signs with Rainbow Glow flasher. Sizes and styles to suit any kind of store, garage, theatre, etc. Cash or time sales. Commission of $12.50 to $50 per order. Unlimited field.

You Can Easily Earn $100.00 a Week!

Only a few orders a week puts you in the $5,000 class. We work with our men—give them detailed instructions—show them in an easy, understandable manner how to figure and quote prices and help them sell through our intensive co-operation. Commissions on sales are paid promptly. This is a dignified proposition—a permanent connection—and the money earning possibilities are unlimited.

Dazzlers Are the Lowest Price High Grade Electric Signs on the Market. Sold to Merchants on Easy Terms.

Write Today Let us send you our beautifully illustrated Book of Dazzler Electric Signs and full details of big money-making proposition. Some exclusive territory still available. Write or wire at once for complete information!

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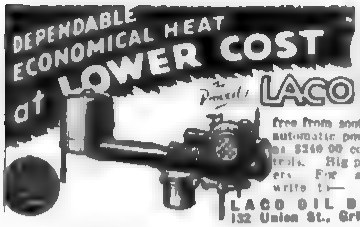
DEPENDABLE ECONOMICAL HEAT at LOWER COST
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The LACO wick type OIL BURNER revolutionizes oil heating. The oil is converted into gas. The gas flame burns entirely in suspension. Very safe, free from soot and smoke. Full automatic power burner as low as $240.00 complete with controls. Big profit for live dealers. For sales opportunity write to—

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132 Union St., Griswold, Ia., U.S.A.

THRILLING NEW AIRPLANE OFFER—FLYING Scale Model "Spirit of ST. LOUIS." Rises

from ground. Flies fast and far by own power. Lots of fun. Very realistic! Scientifically designed! 12 in. h wing. Easy building kit (regularly $1) and big catalog Record Prize Winning Contest Models and Supplies (worth 10c) BOTH, for limited time, postpaid only 50c. Must satisfy or money back.

OHIO MODEL SUPPLY 8 E. Long COLUMBUS, OHIO

50c This special offer introduces exclusive line of scale models and prize-winning contest kits using newest aerodynamic principles and construction methods—just like real airplanes! Send remittance NOW!

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Cured Forever or No Pay. Full treatment sent on trial. Can be given secretly in privacy of home. Guaranteed to banish forever all desire for whiskey, gin, wine, home brew, moonshine, opium, morphine, heroin, paregoric and laudanum. Costs $2.00 if cures, nothing if fails. Save him from poison.

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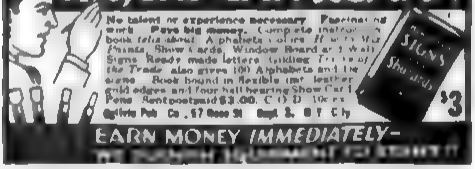
Anyone CAN LEARN


No talent or experience necessary. Fascinating work. Pays big money. Complete instruction book tells about Alphabets, Colors, Hearts, Mix Paints, Show Cards, Window Board and Wall Signs. Ready made letters. Gilding Tricks of the Trade also gives 100 Alphabets and Designs. Book bound in flexible imit. leather, gold edges and four ball bearing Show Card Pens. Sent postpaid $3.00. C.O.D. 10c ex.

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Low cost home plan, for the country. Send for Circular Book on Many New Inventions, Illustrated: by mail 1.00
Good Commissions to SALESMEN, with District assigned.
(Audubon) — R. D. 1, Phoenixville, Pa., U. S. A.

Acrobats of the Air

(Continued from page 73)

provided on the undercarriage vee struts in the shape of pants, so that fuel feeds naturally to the motor. Otherwise it'd cough and spit and konk.

Well, gang, there you are! Possibly as ships get hotter you'll have a chance to evolve some new stunts that'll carry your name down through the annals of aviation. Be careful though! Just the other day I made a solo in which I changed cockpits on a Waco. I set the elevator before I left the stern cockpit of the ship, and climbed over to the front cockpit with the motor throttled. Then I gunned her and flew along low over the field. I had 1800 feet when I started, and lost a couple hundred in the change. But when doing these things one has to be careful. That's the secret of long life in the air.

First Television Wedding

WITH the minister in Des Plaines, Ill., and the principals in Chicago, the first television wedding in history took place on the stage of the Chicago Coliseum

when James Fowlkes and Cora Dennison, shown above, were united in marriage. Although separated by a score of miles, the minister saw the couple and the couple saw him through a television apparatus which also enabled the words of the marriage vow to be repeated over the distance. The picture shows the bride and groom standing before the television apparatus.

Repeat ads in the classified section of Modern Mechanics prove the value of this class of advertising.

I Positively Guarantee

to increase your arms one-half inch in size, chest one full inch, strength 2[illegible]%, health, 100% in one week's time by following my instructions and using my exerciser 10 minutes mornings and at night. Send $1 for complete course and exercisers. Satisfaction guaranteed or $1 refunded.

PROF. J. A. DRYER
Box 1858-R Chicago, Ill.

Hear the Aero-Call

SHORT WAVE CONVERTER

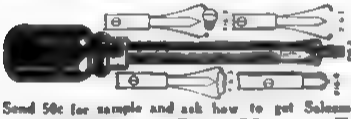
Factory - Built, Complete, Ready to Operate, Filtered - Shielded. Plugs into Any Radio Set. Two Models, A.C. and D.C., $25.00
Write for literature
AERO PRODUCTS, Inc.
4611 E. Ravenswood Avenue, Department 1589, Chicago, Illinois.

FLY THIS 12-INCH MONOPLANE!

A very realistic model of Lindbergh's Spirit of St. Louis. Will rise from ground by own power and fly 40 feet or more. Easily built without tools. Construction set, with all parts and full directions, postpaid in U. S. and Canada, only 50c [illegible] stamps). Satisfaction or money back. Send now.
MANN & BENTON. Box L CHILLICOTHE, OHIO

SALESMEN WANTED!

SELL COX HOLDFAST SCREW DRIVERS

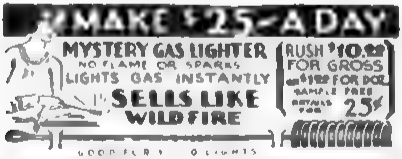


Sells on sight to mechanics for Auto, Radio and Electrical Work. Self Holding. Self Releasing.

Send 50c for sample and ask how to get Salesman's Outfit Free.
S. J. COX, Dept. M. Franklin, Pa.

NEW YEAR - NEW IDEA
PATENT YOUR IDEAS
Call or send me a sketch of your invention. Phone Longacre 3088
FREE Inventors Recording Blank
U. S. and Foreign Patents secured by
Z.H.POLACHEK Reg. Patent Attorney
1234 BROADWAY, NEW YORK

MAKE $25 A DAY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NO FLAME OR SPARKS
LIGHTS GAS INSTANTLY
SELLS LIKE WILD FIRE
RUSH $10.00 FOR GROSS
or $1.00 FOR DOZ.
SAMPLE FREE
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Make $20 A Day
Showing My Mystery Lighter to Men. What Makes it Light?
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For a limited time only we will give *absolutely free* Major PAGE'S sensational "best seller" among aviation books, 256 pages crammed full of the latest dope on modern aircraft, [illegible] motors, control systems, lessons on [illegible] technical language, especially for beginners planning to go into aviation. Mail coupon, send no money.

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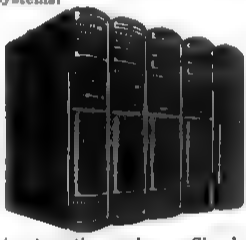
Can you take the "play" out of differentials? Can you kill the SHIMMY in steering? Can you reset TIMING? Can you put your finger on engine-trouble without guessing or tinkering? Can you pull the STARTER off and fix it? Can you adjust and repair transmission, rear-axles, engines and electrical systems?

These Books Tell HOW!



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5 BIG VOLUMES
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Don't "Study"— LOOK IT UP!

The ten-billion dollar auto industry offers rich prizes to men with gumption enough to really learn all branches of automotive mechanics. A better job—bigger pay—the chance to go into business for yourself and get a share of the huge profits are waiting for any man who even half tries to improve his ability to deliver service. And here's the *quickest*, easiest way—no tedious memorizing or lessons. JUST LOOK UP the facts you seek. You'll find the answer to any auto problem literally at your finger-tips in the famous JIFFY INDEX.

American Technical Society
[illegible]

DON'T SEND A PENNY!

American Technical Society
Dept. AG-320 Drexel Ave. & 59th St., Chicago, Ill.

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A gold mine of facts can often be converted into a gold mine of dollars, for builders not only save money but learn how to make more money with the five big books on architecture carpentry and building. Carpenters make themselves contractors by learning how to estimate correctly; contractors are able to handle bigger and more profitable jobs by learning how the big fellows do it; architects and those who want to enter this highly paid profession earn more money by having facts and figures at their finger tips. Men who want to build homes, even though they are not doing the work themselves, can save money by learning how it should be done.

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I would like to look at the five books on architecture, carpentry and building described above. Send them on your free offer. I will examine them thoroughly and return them in ten days unless I like them in which case I will send you $2.00 and after that $3.00 per month until the total price of only $24.80 is paid. You are also to send me your book of architectural plans containing over 100 illustrations and 28 plates covering the five orders of Architecture, without one penny of extra charge.

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PAGE-DAVIS SCHOOL OF ADVERTISING
Dept. 285-C 3601 MICHIGAN AVE., CHICAGO, ILL.

Wonder-Planes of the Navy

(Continued from page 59)

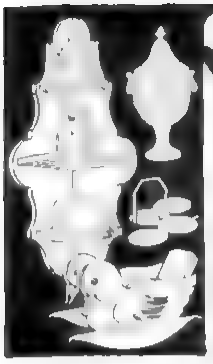
decides their size. By using folding wing designs, the capacity of the underdeck hangars of the airplane mother ship is practically doubled. Seaplanes not equipped with landing gear alight on the surface alongside the ship and are hauled aboard with block and tackle through a special opening in the side of the ship.

Who can predict what the fighting plane of tomorrow will be like? Whatever its design, it may be taken as a sure thing that Uncle Sam's engineers will be in the vanguard.

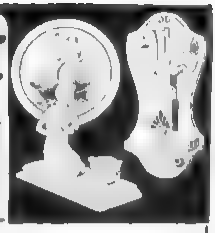
Traffic Signal Works by Sound

IF THE traffic signal says "stop" in Burlingame, Cal., the honk of a horn will change it to "go" and the motorist can be on his way.

The apparatus shown below is one of the new machines recently installed. It requires the motorist to come to a complete stop before crossing the arterial highway.



Men! Extra Money Quick



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to bring you a fine cash income! Without taking any time away from your job. Pleasant easy work at home. Decorate beautiful giftwares the Fireside way. You can do it—in spare moments. No previous training required. No special ability needed. No tedious study. No memorizing. With the Three Simple Steps sent you by Monsieur Petit the great artist—Director of Fireside Industries, it is just fun! We want men in every community. Be the first! Dept. 142-K

Fireside Industries, Adrian, Mich.

Begin Right Now!

Thousands are making Fireside decorations—ranging from hundreds to thousands of dollars—and doing their own work besides. We supply you with everything you need. The Genuine Complete Kit WITHOUT EXTRA COST. It's a cinch! We absolutely guarantee your success.

FREE!

Fill out and mail coupon at once. Without any obligation. It brings you wonderful Fireside Book in colors. Explains everything. ACT NOW!

Fireside Industries,
Dept. 142-K, Adrian, Mich.

Send me your wonderful Free Book in colors. This does not put me under any obligation.

Name .....

Address .....

AUTOMATIC WINDOW WASHER

Washes, Cleans, Dries Polishes in One Quick Operation

Amazing new invention. CARRIES OWN WATER SUPPLY! Eliminates all drudgery and splashing! 6 times as fast as old methods. Patented features: **No pail. No brush. No sponge. No chamois.** Can be used with or without a pole. **$90-$150 weekly easy for agents.** Sells on sight. Sensational demonstration! Every housewife, auto-ist, store owner a prospect. Write for our **Free Sample Offer** and big money-making proposition. Be first.

NATIONAL INDUSTRIES, Dept. 468, 67 E. Lake St., Chicago

ELECTRIFY YOUR RADIO FOR ONLY $6.85 COMPLETE

Why discard your present good set when you can electrify it for only $6.85, and banish the annoyance and expense of buying new "B" batteries?

Over 100,000 Townsend Power Units In Use

Hooked up in a few minutes. Use same tubes—no changes. You'll be amazed at the improvement in reception and distance getting. Send name and address today for full details, proof and Free Trial Offer.

TOWNSEND LABORATORIES

773 Townsend Street Chicago, Illinois

It's Here! the Tuned Underground Aerial *for Better Reception*

Here's great news! For the same cost as an ordinary overhead aerial you can now enjoy greatly improved reception and be through once and for all with the old-fashioned, inconvenient, noise-gathering roof aerial. SUB-TONE, the amazing new TUNED Underground Aerial, is designed to decrease static and noise, get finer selectivity and give true radio enjoyment, by virtue of Tuning the underground aerial to the radio circuit.

With an untuned aerial frequently the sensitivity of the set is not great enough to give the broadcast signal a predominating strength over the existing noise level. As a result static predominates and the set is unable to get the desired broadcasts.

With SUB-TONE the aerial is tuned to the broadcast being received. This allows the broadcast signal to have greater strength than the static and noise. Greater selectivity is allowed and reception is clearer and more enjoyable.

SUB-TONE Works on A. C. or D. C. Sets or Sets Operated with Batteries or Battery Eliminators.

So Simple a Child Could Install It!

Takes but a few minutes. Just dig a small hole and place the aerial in it. SUB-TONE is also equipped with a scientific ground plate. The lead-in wires are brought to the set—the aerial wire connecting first to a binding post on the Tuner, a small, compact device that can be placed in the radio cabinet or any convenient place near it.

TRY SUB-TONE FREE

You don't need to take our word for the merits of SUB-TONE—we want you to try it and prove to yourself what tests and reports from users have already proved to us. Just hear the difference and judge for yourself. If you aren't delighted with the improvement the trial doesn't cost you a cent. Send for all the startling information on SUB-TONE. Write today!

BETTER RADIO PRODUCTS

141 W. Austin Ave., Dept. 724-L.T., Chicago, Ill.

Better Radio Products,
141 W. Austin Ave.,
Dept. 724-L.T., Chicago, Ill.

Rush details and proof on SUB-TONE, the new Tuned Underground Aerial, and how I can test it Free.

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Address .....

City ..... State .....

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Here is the most remarkable book ever offered to inventors. One [illegible] inventions listed and described. Arranged as follows: General Problems, Automotive, Mechanical; Electrical; Chemical, Radio; Television, Marine. Separate chapter on the Ten Most Needed Inventions. This book may give you one idea that will win you a fortune. Nothing else like it has ever been published. New revised 1929 edition. Compiled at enormous expense. Edited by Raymond Francis Yates, formerly Managing Editor of a leading scientific magazine. Over 100 pages, durably bound. Price $1.25.

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Foremen!

Increase Your Pay!

No matter how many years you've been on the job, you'll find LaSalle home-study training in Modern Foremanship a real [illegible]-maker for you. Here's why. Right after the war, [illegible] Meyer Bloomfield and a number of other experts who had won distinction in the field of production engineering, undertook to gather, analyze and organize for LaSalle the experience of *more than 5,000 practical foremen and production men in every line of industry.* Upon this basic material they built a truly remarkable training course covering every phase of the foreman's job. "Have received two promotions and a 'raise' in salary of $75 a month"—"Have increased the production of my department 20%"—"My monthly salary is now $310—a 'raise' of $125 a month"—these are but a few of the many tributes paid [illegible]. Low cost; easy terms. Complete details in an attractive 64-page book, "Modern Foremanship," sent you free upon request. Write for it today.

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"Moving Oceans Inland"

How a proposed gigantic spillway will link inland America with the sea. Read about it in MODERN MECHANICS for September.

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BARAWIK CO., 418 Canal Sta., Chicago, USA
Mail This Coupon Now for Free Radio Guide

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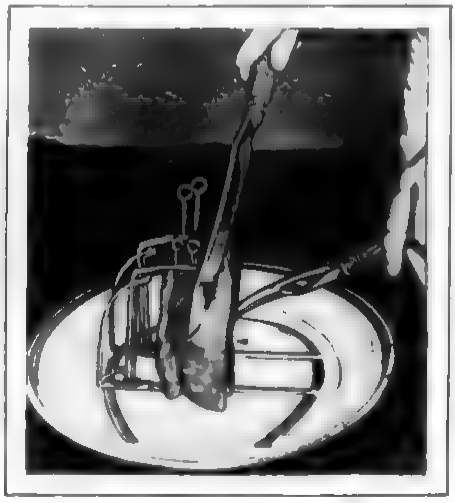
New Aids for the Housewife

TWO little devices which will appeal to the housewife have recently been placed on the market. One of them, illustrated above, is a can opener with a protecting guard for the thumb which prevents its being cut by the jagged rim of the tin should the hand slip. The other device, shown in the photo below, is a clamp which holds small cuts of meat securely in position while carving.



RUPTURE IS NOT A TEAR

NO BREAK TO HEAL

Rupture is not a tear, but purely a muscular weakness in the abdominal wall. Trusses merely brace these muscles but do not strengthen them—on the contrary, the gouging of the ordinary truss pad often increases this weakness as it tends to shut off circulation of the blood.

STUART'S ADHESIF PLAPAO-PADS are entirely different—being mechanico-chemico applicators—made self-adhesive purposely to keep the muscle-tonic called "Plapao" continuously applied to the affected parts, and to minimize danger of slipping and painful friction. The adhesive fabric is soft as velvet, and clings to the body without straps, buckles or springs. Easy to apply—comfortable—inexpensive. Awarded Gold Medal, Rome, Grand Prix, Paris, Honorable Mention, Panama Pacific Exposition, San Francisco, etc. For almost a quarter century stacks of sworn testimonials from many different countries report success—without delay from work. The epidermatic absorption of Plapao and the utilization of "plaster therapy" tend toward a natural process of recovery, **after which no further use for a truss.**

Stop wasting your time and money on old-fashioned devices. Learn how to close the hernial opening as nature intended, so the rupture can't come down. Send no money; just mail the Free Test coupon below. For your own good—write today—tomorrow may be too late.

FREE TEST COUPON

Plapao Laboratories, Inc.
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Send me a Free 10 day test supply of the remedial factor Plapao and 48-page illustrated book on Rupture; no charge for this now or later.

Name .....

Address .....

Breaking into the Talkies

Studios are sounding a clarion call for players who have pleasing voices, as well as charm of face and figure. What are your chances to break into the movies? Let a special SCREEN SECRETS staff writer answer your questions with facts.

in the August issue of

Screen Secrets

Magazine

ALSO for AUGUST —

My Life Among the Stars, by Betty Compson, **Buddy Rogers' Dream Girl** and colorful personality stories about other famous players. Also Harry Carr's department of intimate gossip from the studios and informal comment of the screen by Robert E. Sherwood.

ON SALE JULY 10th

?

If your newsstand can't supply you, send 25c in cash or stamps to SCREEN SECRETS magazine, Fawcett Publications, Inc., Minneapolis, Minn.

Kill This Man!

THERE's a devil inside of you. He's trying to kill you. Look out for him! He tells you not to work so hard. What's the use? The boss only piles more work on you. He tells you not to bother with your body. If you're weak—you always will be weak. Exercise is just a lot of rot. Do you recognize him? Of course you do. He's in us all. He's a murderer of ambition. He's a liar and a fool. *Kill him!* If you don't he will kill you.

EARLE LIEDERMAN, the Muscle Builder
Author of "Science of Wrestling," "Muscle Building," "Secrets of Strength," "Here's Health," "Endurance," etc.

Saved

Thank your lucky stars you have another man inside of you. He's the human dynamo. He fills you full of pep and ambition. He keeps you alive—on fire. He urges you on in your daily tasks. He makes you strive for bigger and better things to do. He makes you crave for life and strength. He teaches you that the weak fall by the wayside, but the strong succeed. He shows you that exercise builds live tissue—live tissue is muscle—muscle means strength—strength is power. Power brings success! That's what you want, and gosh darn your old hide! You're going to get it.

Which Man Will It Be!

It's up to you. Set your own future. You want to be the Human Dynamo? Fine! Well, let's get busy. That's where I come in. That's my job. Here's what I'll do for you:

In just 30 days I'll increase your arm one full inch with real live, animated muscle. Yes, and I'll add two inches to your chest in the same time. Pretty good, eh? That's nothing. Now come the works. I'll build up your shoulders. I'll deepen your chest. I'll strengthen your whole body. I'll give you arms and legs like pillars. I'll literally pack muscle up your stomach and down your back. Meanwhile I'll work on those inner muscles surrounding your vital organs. You'll feel the thrill of life shooting up your old backbone and throughout your entire system. You'll feel so full of life you will shout to the world, "I'm a man and I can prove it."

Sounds good, what? But listen! That isn't all. I'm not just promising these things. *I guarantee them!* It's a sure bet. Oh, boy! Let's ride.

SEND FOR MY NEW 64-PAGE BOOK "Muscular Development" **IT IS FREE**

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Dear Sir: Please send me, absolutely FREE and without any obligation on my part whatever a copy of your latest book, "Muscular Development."

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What do you think of that? I don't ask one cent. And it's the peppiest piece of reading you ever laid your eyes on. I swear you'll never blink an eyelash till you've turned the last cover. And there's 48 full-page photos of myself and some of my prize-winning pupils. This is the finest art gallery of strong men ever assembled. And every last one of them is shouting my praises. Look them over. If you don't get a kick out of this book, you had better roll over—you're dead. Come on, then. Take out the old pen or pencil and sign your name and address to the coupon. If you haven't a stamp, a postal will do. But snap into it. Do it now. Tomorrow you may forget. Remember, it's something for nothing and no strings attached, no obligation. GRAB IT!

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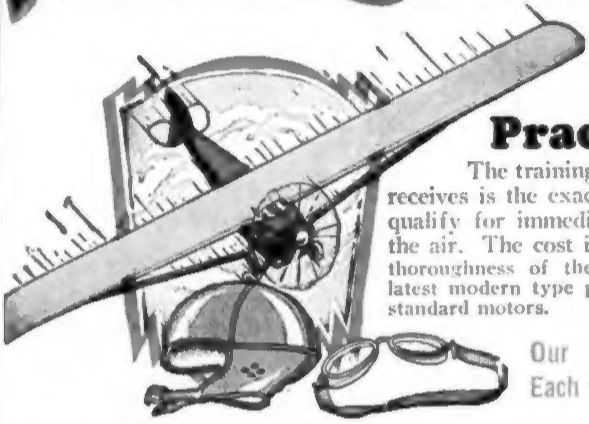
"The Von Hoffmann Graduate Qualifies"

Von Hoffmann Aircraft School



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The training which the Von Hoffmann student receives is the exact training which he must have to qualify for immediate positions on the ground or in the air. The cost is low considering daily flying, the thoroughness of theoretical and ground instruction on latest modern type planes, Wright Whirlwind and other standard motors.

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All Airplanes used by us for both instruction and passenger service are planes licensed by the U. S. Government and our instructors are U. S. Licensed Transport Pilots and U. S. Licensed Mechanics. Our equipment is new and of modern design, subject to daily U. S. Government Inspection. (We have a resident U. S. Government Inspector on the field—think what this means to you.)

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Our record to date shows that every Von Hoffmann graduate has received a U. S. Government License.

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We teach you by actual flying and practical instruction; no long course needed. No student bond required.

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It is easy to pay the Von Hoffmann way because small monthly payments are extended. Let us show you how you can start now and pay later, even after you have finished the course of training.

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(Lindbergh's Own Field)
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Free Information Coupon

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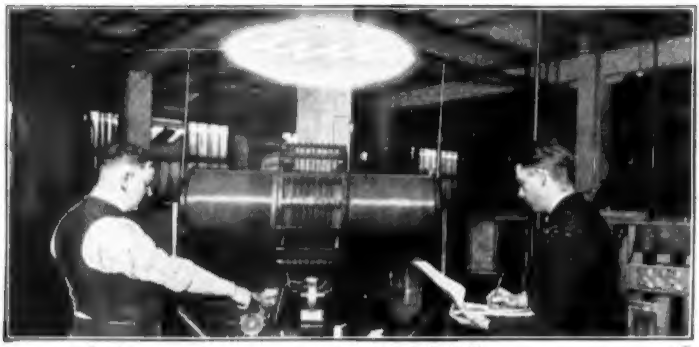
220 Lambert-St. Louis Flying Field (Lindbergh's Own Field), St. Louis, Mo.
Please mail FREE information at once.

Name ..... Address ..... Town ..... State ..... Age .....



500,000 VOLTS

"Artificial lightning" being developed in Coyne School. Spark of 500,000 volts is shown jumping 30 inches. This gigantic Tesla Coil is the same as that used by Steinmetz, absolutely harmless, because of high frequency.

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By ACTUAL WORK—in the Great Shops of Coyne

ANYONE with common schooling who can see and understand the English language can master electricity in 90 days. I teach you with as complete an outlay of electrical apparatus as was ever assembled in any institution—30-foot control board—transmitting stations—skeleton houses, huge motors—dynamos—sub-stations—automobiles—switchboards. In one department we generate enough electricity to supply a small city!

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Enter anytime. Experts teach you on electrical machinery and *not books.* They guide you every step of the way with individual attention. You do the actual work on real full-size machinery in full operation. Take motors for instance. Instead of learning from books and charts—you actually build motors. You can't help but know all about them. Anyone can learn this fascinating way.

No Experience Necessary

That's how my methods make men master electricity in 12 wonderful weeks. You don't need experience—Coyne training starts from the very beginning. You don't need advanced education—you learn by doing. Age is no handicap—Coyne students range from 16 to 45.

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I don't need to tell you about the opportunities in electricity. They are too many and too amazing to mention. Ordinary jobs run $50—$60 and up a week. And Coyne training leads to the biggest positions. Many Coyne men are making up to $500 a month. Demand for Coyne men often exceeds the supply. Our employment bureau gives you lifetime service after graduation.

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We help many students who haven't much money to secure part-time jobs to earn a good part or all of living expenses while training.

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This school is 29 years old—Coyne training is tested—proven beyond all doubt—endorsed by electrical industry. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs—facts—jobs—salaries—opportunities. See what Coyne training can do for you in just 90 days! This does not obligate you. So act at once. Just mail the coupon.

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